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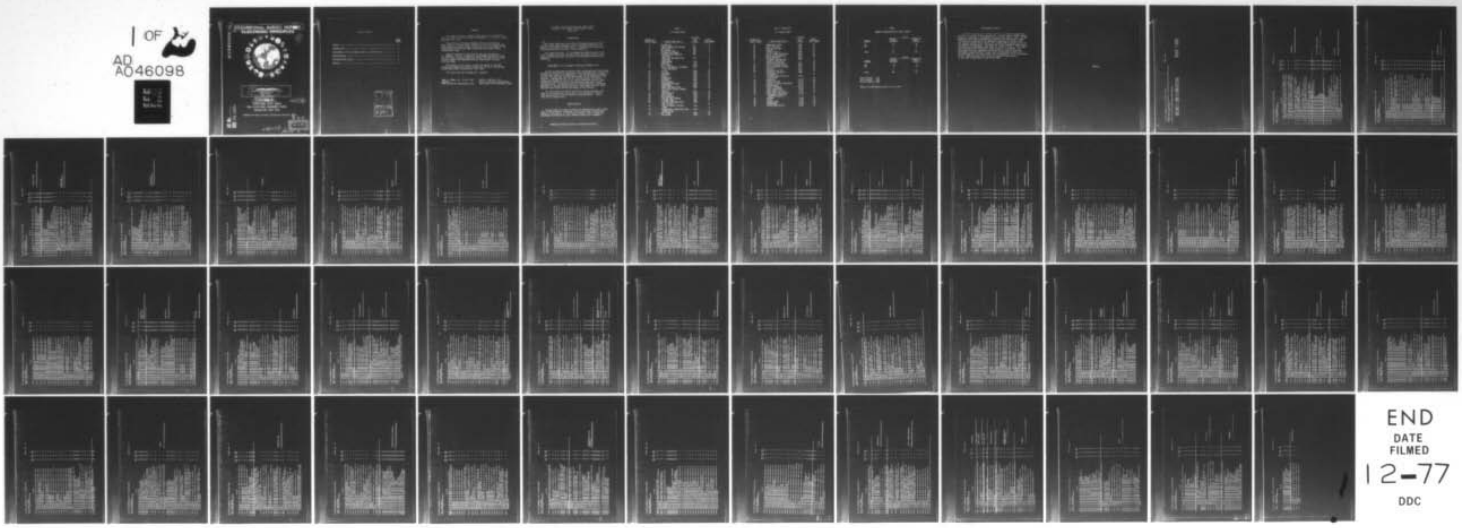

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OCCUPATIONAL SURVEY REPORT.
ELECTRONIC PRINCIPLES

(6) ELECTRONIC PRINCIPLES
DEFENSIVE FIRE CONTROL SYSTEMS
CAREER LADDER
AFSC 321X1.

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OCCUPATIONAL SURVEY BRANCH
USAF OCCUPATIONAL MEASUREMENT CENTER
LACKLAND AFB TEXAS 78236

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PREFACE

This report presents a summary of the results of a detailed Air Force Electronic Principles Survey of the Defensive Fire Control Systems Specialty, AFSC 321X1.

The Electronic Principles Inventory (EPI) was developed by Major Thomas J. O'Connor and Mr. Hendrick W. Ruck and the survey data were analyzed by Captain Rodger D. Ballentine. All are members of the Occupational Survey Branch, USAF Occupational Measurement Center, Lackland AFB, Texas.

Computer programs for analyzing the data were designed by Dr. Raymond E. Christal, Occupational and Manpower Research Division, Air Force Human Resources Laboratory (AFHRL), and were written by the Project Analysis and Programming Branch, Computational Sciences Division, AFHRL.

Distribution of this report is made upon request to the USAF Occupational Measurement Center, attention of the Chief, Occupational Survey Branch (OMY), Lackland AFB, Texas 78236.

This report has been reviewed and is approved.

JAMES A. TURNER, JR., Colonel, USAF
Commander
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ELECTRONIC PRINCIPLES OCCUPATIONAL SURVEY REPORT
DEFENSIVE FIRE CONTROL SYSTEMS CAREER LADDER
AFSC 321X1

INTRODUCTION

This report summarizes the results of the administration of the Electronic Principles Inventory to airmen assigned to Defensive Fire Control Systems Specialty (AFSC 321X1). The data for this report were collected during the period April through June 1977.

This report describes: (1) development and administration of the survey instrument; and (2) electronic principles used by DAFSC 5-skill level personnel both CONUS and overseas and assigned to selected major commands.

DEVELOPMENT OF THE ELECTRONIC PRINCIPLES INVENTORY (EPI)

The EPI was developed by personnel from the Occupational Survey Branch who were well qualified in theoretical physics and electronics, as well as in task analysis and survey development. Over 300 maintenance personnel from SAC, TAC, ADC, MAC, and AFCS participated in the development of the inventory. Representing the five ATC training centers, electronics experts who averaged 12 years of maintenance experience and four years of electronic principles instruction experience spent several weeks refining the EPI. In addition, personnel at the Electrical Engineering Department of the USAF Academy and the Air Force Human Resources Laboratory were consulted during the development of the inventory.

The final version of the EPI used in this survey contained 1,257 items in 62 subject matter areas covering all electronic principles training given at the five ATC technical training centers. Table 1 lists the 62 subject areas.

ADMINISTRATION

The Electronic Principles Inventory was administered by mail to AFSC 321X1 airmen worldwide. Responses from 115 individuals represented 67 percent of the total of all AFSC 32151 personnel. Table 2 shows the percentage distribution by major command of the survey incumbents.

TABLE 1

EPI SUBJECT AREAS

SEQUENCE OF SUBJECT AREAS	SUBJECT AREA TITLE	BEGINNING ITEM NUMBER	GPSUM PAGE NUMBER
1	MATHEMATICS	A1	2
2	DIRECT CURRENT AND VOLTAGE	A15	2
3	RESISTANCE	A24	2
4	MULTIMETER USES	B52	3
5	ALTERNATING CURRENT	B61	4
6	INDUCTORS AND INDUCTIVE REACTANCE	B67	4
7	CAPACITORS AND CAPACITIVE REACTANCE	C92	5
8	TRANSFORMERS	C128	6
9	MAGNETISM	C171	7
10	RCL CIRCUITS	D185	8
11	SERIES AND PARALLEL RESONANCE (TIME CONSTANTS)	D229	9
12	FILTERS	D239	10
13	COUPLING	E261	11
14	SOLDERING	E273	11
15	RELAYS	E295	12
16	MICROPHONES	F314	12
17	SPEAKERS	F327	13
18	OSCILLOSCOPES	F342	13
19	SEMICONDUCTOR DIODES	G354	13
20	TRANSISTORS	G404	15
21	TRANSISTOR AMPLIFIERS	G428	16
22	SOLID-STATE SPECIAL PURPOSE DEVICES	H477	19
23	POWER SUPPLIES	H483	19
24	OSCILLATORS	H512	19
25	MULTIVIBRATORS	I539	20
26	LIMITERS AND CLAMPERS	I555	21
27	ELECTRON TUBES	I565	21
28	ELECTRON TUBE AMPLIFIERS AND CIRCUITS	J609	22
29	SPECIAL PURPOSE ELECTRON TUBES	J616	23
30	HETERODYNING, MODULATION, AND DEMODULATION	J632	23
31	AM SYSTEMS	K638	23
32	FM SYSTEMS	K666	24

TABLE 1 (CONTINUED)

EPI SUBJECT AREAS

SEQUENCE OF SUBJECT AREAS	SUBJECT AREA TITLE	BEGINNING ITEM NUMBER-	GPSUM PAGE NUMBER
33	NUMBERING SYSTEMS	K685	25
34	LOGIC FUNCTIONS	L695	25
35	BOOLEAN EQUATIONS	L708	26
36	COUNTERS	L733	27
37	TIMING CIRCUITS	M757	27
38	USE OF SIGNAL GENERATORS	M769	28
39	MOTORS AND GENERATORS	M779	28
40	METER MOVEMENTS	N808	29
41	SATURABLE REACTORS AND MAGNETIC AMPLIFIERS	N818	29
42	WAVESHAPING CIRCUITS	N834	30
43	SINGLE SIDEBAND SYSTEMS	0845	30
44	PULSE MODULATION SYSTEMS	0875	31
45	ANTENNAS	0914	32
46	TRANSMISSION LINES	P953	34
47	WAVEGUIDES AND CAVITY RESONATORS	P984	35
48	MICROWAVE AMPLIFIERS AND OSCILLATORS	P1034	37
49	REGISTERS	Q1110	39
50	STORAGE DEVICES	Q1117	40
51	DIGITAL TO ANALOG CONVERTERS	Q1126	40
52	PHANTASTRONS	Q1140	41
53	SCHMITT TRIGGERS	R1141	41
54	CABLE FABRICATION	R1144	41
55	INPUT/OUTPUT DEVICES	S1146	41
56	PHOTO SENSITIVE DEVICES	S1149	41
57	SYNCHRONOUS VIBRATIONS (CHOPPER CIRCUITS)	S1150	41
58	INFRARED	T1159	41
59	LASERS	T1186	42
60	DISPLAY TUBES	T1220	43
61	PROGRAMMING	U1234	44
62	DB AND POWER RATIOS	U1255	44

TABLE 2

COMMAND REPRESENTATION OF SURVEY SAMPLE

	32151G	
COMMAND	PERCENT ASSIGNED*	PERCENT OF SAMPLE
SAC	97	96
ATC	3	4
TOTAL	100	100

	32151E	
COMMAND	PERCENT ASSIGNED	PERCENT OF SAMPLE
SAC	92	92
ATC	8	8
TOTAL	100	100

Total Assigned - 178
Total Sampled - 115
Percent Sampled - 67%

*Based on Airman Manning data as of July 1977

PRESENTATON OF RESULTS

Personnel responded "yes" or "no" to the 1,257 electronic principles questions as related to their present job. A Group Summary (GPSUM) computer printout is provided in the Appendix portion of this report. Page 1 of the GPSUM lists the three selected groups identified for this report. Pages 2-44 show the percentage of the incumbents responding to the EPI items. The computer program results display the percent members answering "yes" to the subject area questions. The reader can locate a specific subject area by referring to the Appendix page number as listed in Table 1. For example, the Transformers area results are given on page 6 of the GPSUM. The percentage of survey respondents indicating use of specific electronic principles ranged from high in areas such as Alternating Current (p.4) and Soldering (p.11) to low in areas such as Microphones (p.12) and Speakers (p.13). Additional AFSC 321X1 data can be obtained upon request to the Chief, Occupational Survey Branch (OMY).

APPENDIX

TABULATION OF ELECTRONIC PRINCIPLES UTILIZATION DATA FOR SELECTED GROUPS
IN THE 32151 CAREER FIELD.

REPORTS ON THE FOLLOWING GROUPS WERE REQUESTED

GROUP IDENTITY = SPC026	ALL AIRMEN DAFSC 32151	CONTAINING	115 MEMBERS.
GROUP IDENTITY = SPC028	ALL AIRMEN DAFSC 321516	CONTAINING	52 MEMBERS.
GROUP IDENTITY = SPC029	ALL AIRMEN DAFSC 32151E	CONTAINING	26 MEMBERS.

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

		BY-TSK	SPC 026	SPC 028	SPC 029	
A	1	A1-01 IN YOUR PRESENT JOB, DO YOU USE INSTRUMENTS, SUCH AS METERS OR OSCILLOSCOPES, IN WHICH IT IS NECESSARY TO AMPLIFY OR ATTENUATE VOLTAGE, RESISTANCE, ETC., BY POWERS OF 10.	82	85	73	
A	2	A1-02 DO YOU USE PUBLICATIONS, SUCH AS A TECHNICAL ORDERS OR MAINTENANCE MANUALS, IN WHICH IT IS NECESSARY FOR YOU TO MULTIPLY OR DIVIDE BY A POWER OF 10 BEFORE YOU CAN APPLY THE INFORMATION FROM THE PUBLICATION IN A USEFUL WAY ON THE JOB.	32	23	38	MATHEMATICS
A	3	A1-03 DO YOU REARRANGE AND SOLVE FORMULAS OR EQUATIONS.	23	19	23	
A	4	A1-04 DO YOU CALCULATE THE SQUARE ROOT OF A QUANTITY.	1	0	4	
A	5	A1-05 DO YOU SOLVE FOR UNKNOWN QUANTITIES.	20	19	23	
A	6	A1-06 DO YOU CONVERT NUMBERS TO LOGARITHMS.	3	0	12	
A	7	A1-07 DO YOU USE LOGARITHM TABLES IN ANY TYPE OF CALCULATIONS.	3	0	8	
A	8	A1-08 DO YOU SOLVE QUADRATIC EQUATIONS.	3	0	8	
A	9	A1-09 DO YOU USE THE NATURAL SYSTEM OF LOGARITHMS.	1	2	0	
A	10	A1-10 DO YOU PERFORM CALCULATIONS ON VECTOR QUANTITIES.	1	2	0	
A	11	A1-11 DO YOU WORK WITH TRIGONOMETRIC FUNCTIONS SUCH AS SINE, COSINE, OR TANGENT.	9	8	8	
A	12	A1-12 DO YOU DETERMINE AREAS OF PLANE FIGURES.	2	0	8	
A	13	A1-13 DO YOU SOLVE OR USE SIMULTANEOUS EQUATIONS.	3	0	8	
A	14	A1-14 DO YOU SOLVE OR USE PROPORTIONS.	4	2	12	
A	15	A2-01 DO YOU USE THE TERM VOLTAGE OR VOLT (V).	97	98	100	
A	16	A2-02 DO YOU USE THE TERM ELECTROMOTIVE FORCE (EMF).	20	23	27	
A	17	A2-03 DO YOU USE THE TERM OHM.	94	96	96	
A	18	A2-04 DO YOU USE THE TERM ION.	4	6	4	
A	19	A2-05 DO YOU USE THE TERM DYNE.	3	4	4	DIRECT CURRENT AND VOLTAGE
A	20	A2-06 DO YOU USE THE TERM AMPERE.	85	90	88	
A	21	A2-07 DO YOU USE THE TERM NEUTRON.	7	6	4	
A	22	A2-08 DO YOU USE THE TERM COULOMB.	9	10	4	
A	23	A2-09 DO YOU USE THE TERM PROTON.	6	6	4	
A	24	A3-01 DO YOU WORK WITH RESISTORS IN YOUR PRESENT JOB.	83	90	92	
A	25	A3-02 DO YOU INSPECT RESISTORS.	81	96	85	
A	26	A3-03 DO YOU CLEAN RESISTORS.	48	60	38	
A	27	A3-04 DO YOU ADJUST RESISTORS.	83	92	85	
A	28	A3-05 DO YOU CHECK OHMIC VALUE OF RESISTORS.	83	96	85	
A	29	A3-06 DO YOU REMOVE OR REPLACE RESISTORS.	78	88	88	
A	30	A3-07 DO YOU USE OR REFER TO TEMPERATURE COEFFICIENTS FOR RESISTORS ON ANY TASKS YOU PERFORM.	19	17	23	
A	31	A3-08 DO YOU USE OR REFER TO RESISTOR SYMBOLS SUCH AS FIXED RESISTOR SYMBOLS OR TAPPED RESISTOR SYMBOLS.	70	81	81	RESISTANCE
A	32	A3-09 DO YOU IDENTIFY OR CLASSIFY THE RESISTORS YOU WORK WITH AS CARBON, FIXED WIRE, SLIDE TAP, RHEOSTAT, OR POTENTIOMETER.	67	77	73	
A	33	A3-10 DO YOU USE RESISTOR COLOR CODES WHICH INDICATE OHMIC VALUE OF RESISTANCE.	73	88	88	

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS GPSM11 PAGE 3

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

		BY-TSK	SPC 026	SPC 028	SPC 029	
A	34	A3-11 DO YOU USE RESISTOR COLOR CODES WHICH INDICATE TOLERANCE.	66	83	77	
A	35	A3-12 DO YOU USE RESISTOR COLOR CODES WHICH INDICATE FAILURE RATE.	18	27	15	
A	36	A3-13 DO YOU MAKE DECISIONS IN WHICH YOU MUST DETERMINE HOW TWO OR MORE BATTERIES MUST BE CONNECTED TOGETHER TO ACHIEVE A SPECIFIC VOLTAGE.	15	17	8	
A	37	A3-14 DO YOU USE OR REFER TO THE SCHEMATIC SYMBOLS WHICH REPRESENT BATTERIES, FUSES, CONDUCTORS, LAMPS, OR SWITCHES	87	94	96	
A	38	A3-15 DO YOU CALCULATE TOTAL RESISTANCE FOR SERIES RESISTIVE CIRCUITS.	37	42	46	
A	39	A3-16 DO YOU CALCULATE TOTAL CURRENT FOR SERIES RESISTIVE CIRCUITS.	36	38	46	
A	40	A3-17 DO YOU CALCULATE INDIVIDUAL VOLTAGE DROPS FOR SERIES RESISTIVE CIRCUITS.	31	33	38	
A	41	A3-18 DO YOU CALCULATE POWER DISSIPATION FOR SERIES RESISTIVE CIRCUITS.	23	21	38	
A	42	A3-19 DO YOU CALCULATE TOTAL RESISTANCE FOR SERIES PARALLEL RESISTIVE CIRCUITS.	32	35	38	
A	43	A3-20 DO YOU CALCULATE TOTAL CURRENT FOR SERIES PARALLEL RESISTIVE CIRCUITS.	30	33	35	
A	44	A3-21 DO YOU CALCULATE INDIVIDUAL VOLTAGE DROPS FOR SERIES PARALLEL RESISTIVE CIRCUITS.	29	29	35	
A	45	A3-22 DO YOU CALCULATE INDIVIDUAL BRANCH CURRENTS FOR SERIES PARALLEL RESISTIVE CIRCUITS.	25	21	35	
A	46	A3-23 DO YOU CALCULATE POWER DISSIPATION FOR SERIES PARALLEL RESISTIVE CIRCUITS.	20	21	27	
A	47	A3-24 DO YOU CALCULATE TOTAL RESISTANCE FOR PARALLEL RESISTIVE CIRCUITS.	31	31	42	
A	48	A3-25 DO YOU CALCULATE TOTAL CURRENT FOR PARALLEL RESISTIVE CIRCUITS.	30	31	35	
A	49	A3-26 DO YOU CALCULATE INDIVIDUAL VOLTAGE DROPS FOR PARALLEL RESISTIVE CIRCUITS.	28	27	35	
A	50	A3-27 DO YOU CALCULATE INDIVIDUAL BRANCH CURRENTS FOR PARALLEL RESISTIVE CIRCUITS.	24	19	35	
A	51	A3-28 DO YOU CALCULATE POWER DISSIPATION FOR PARALLEL RESISTIVE CIRCUITS.	18	19	27	
B	52	B1-01 DO YOU MEASURE RESISTANCE.	96	100	88	
B	53	B1-02 DO YOU REPAIR OHMMETERS.	6	4	15	
B	54	B1-03 DO YOU MEASURE VOLTAGE.	96	100	96	
B	55	B1-04 DO YOU REPAIR VOLTMETERS.	4	4	8	
B	56	B1-05 DO YOU REPAIR AMMETERS.	3	4	4	MULTIMETER USES
B	57	B1-06 DO YOU MEASURE CURRENT.	84	100	77	
B	58	B1-07 DO YOU USE MULTIMETERS.	97	100	96	
B	59	B1-08 DO YOU DIRECTLY USE A QUANTITY OF CHARGE CALLED A COULOMB.	3	2	8	
B	60	B1-09 DO YOU READ SCHEMATICS.	95	98	96	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

		DY-TSK	SPC 026	SPC 028	SPC 029	
B	61	B2-01 DO YOU USE OR REFER TO THE TERM EFFECTIVE VOLTAGE (RMS).	66	79	58	ALTERNATING CURRENT
B	62	B2-02 DO YOU USE OR REFER TO THE TERM PEAK TO PEAK VOLTAGE.	82	87	73	
B	63	B2-03 DO YOU USE OR REFER TO THE TERM AVERAGE VOLTAGE (DC).	75	79	73	
B	64	B2-04 DO YOU USE OR REFER TO THE TERM WAVE LENGTH.	70	73	54	
B	65	B2-05 DO YOU USE OR REFER TO THE TERM FREQUENCY.	90	94	88	
B	66	B2-06 DO YOU USE OR REFER TO THE TERM INSTANTANEOUS VALUE.	20	21	27	
B	67	B3-01 DO YOU WORK WITH INDUCTORS OR CIRCUITS CONTAINING INDUCTORS, CHOKES, OR CHOKE COILS IN YOUR PRESENT JOB.	48	56	42	
B	68	B3-02 DO YOU INSPECT INDUCTORS.	38	44	50	
B	69	B3-03 DO YOU CLEAN INDUCTORS.	23	35	15	
B	70	B3-04 DO YOU ADJUST INDUCTORS.	26	31	27	
B	71	B3-05 DO YOU REMOVE OR REPLACE INDUCTORS.	36	38	38	
B	72	B3-06 DO YOU USE OR REFER TO INDUCTANCE.	33	35	35	
B	73	B3-07 DO YOU USE OR REFER TO HENRIES.	17	23	19	
B	74	B3-08 DO YOU USE OR REFER TO INDUCTIVE REACTANCE.	19	19	23	
B	75	B3-09 DO YOU USE OR REFER TO COPPER LOSS IN INDUCTORS.	2	2	4	
B	76	B3-10 DO YOU USE OR REFER TO HYSTERESIS LOSS IN INDUCTORS.	3	6	4	
B	77	B3-11 DO YOU USE OR REFER TO EDDY CURRENT LOSS IN INDUCTORS	3	4	4	
B	78	B3-12 DO YOU USE OR REFER TO THE GENERAL RULE THAT INDUCTANCE IS PROPORTIONAL TO THE SQUARE OF THE NUMBER OF TURNS OF THE COIL.	2	2	4	
B	79	B3-13 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE INDUCTANCE OF A COIL IS DIRECTLY PROPORTIONAL TO THE CROSS SECTIONAL AREA OF THE CORE.	3	2	8	INDUCTORS AND INDUCTIVE REACTANCE
B	80	B3-14 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE INDUCTANCE OF A COIL IS INVERSELY PROPORTIONAL TO ITS LENGTH.	3	4	8	
B	81	B3-15 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE INDUCTANCE OF A COIL IS DIRECTLY PROPORTIONAL TO THE PERMEABILITY OF THE CORE MATERIAL.	3	2	8	
B	82	B3-16 DO YOU CALCULATE INDUCTANCE FOR PARTICULAR INDUCTORS USING FORMULAS.	0	0	0	
B	83	B3-17 DO YOU CALCULATE THE TOTAL INDUCTANCE FOR INDUCTANCE IN SERIES.	3	2	12	
B	84	B3-18 DO YOU CALCULATE THE TOTAL INDUCTANCE FOR INDUCTORS IN PARALLEL.	3	2	12	
B	85	B3-19 DO YOU CALCULATE THE TOTAL INDUCTANCE FOR INDUCTORS IN SERIES-PARALLEL CIRCUITS.	4	4	12	
B	86	B3-20 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT LAGS VOLTAGE IN AC INDUCTOR CIRCUITS.	17	17	27	
B	87	B3-21 DO YOU CALCULATE INDUCTIVE REACTANCE.	2	0	8	
B	88	B3-22 DO YOU USE OR REFER TO THE GENERAL RULE THAT INDUCTIVE REACTANCE IS DIRECTLY PROPORTIONAL TO FREQUENCY.	5	4	12	
B	89	B3-23 DO YOU WORK WITH POWER INDUCTORS.	26	33	27	
B	90	B3-24 DO YOU WORK WITH AUDIO FREQUENCY INDUCTORS.	5	4	4	
B	91	B3-25 DO YOU WORK WITH RADIO FREQUENCY INDUCTORS.	25	31	27	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
C 92	C1-01 DO YOU WORK WITH CAPACITORS OR CIRCUITS CONTAINING CAPACITORS IN YOUR PRESENT JOB.	70	67	77
C 93	C1-02 DO YOU INSPECT CAPACITORS.	66	77	65
C 94	C1-03 DO YOU CLEAN CAPACITORS.	34	42	27
C 95	C1-04 DO YOU ADJUST CAPACITORS.	38	23	42
C 96	C1-05 DO YOU TEST CAPACITORS.	44	46	42
C 97	C1-06 DO YOU DISCHARGE CAPACITORS.	65	73	69
C 98	C1-07 DO YOU REMOVE OR REPLACE CAPACITORS.	64	73	62
C 99	C1-08 DO YOU USE OR REFER TO DISTRIBUTED CAPACITANCE.	7	6	8
C 100	C1-09 DO YOU USE OR REFER TO ORBITAL STRESS OF ELECTRONS IN A DIELECTRIC.	2	0	0
C 101	C1-10 DO YOU USE OR REFER TO FARADS, MICROFARADS, OR PICOFARADS.	50	58	42
C 102	C1-11 DO YOU USE OR REFER TO CAPACITANCE.	57	63	54
C 103	C1-12 DO YOU USE OR REFER TO DIELECTRIC CONSTANT	8	12	4
C 104	C1-13 DO YOU USE OR REFER TO WORKING VOLTAGE RATING OF CAPACITORS	42	42	58
C 105	C1-14 DO YOU USE OR REFER TO CAPACITIVE REACTANCE	26	25	35
C 106	C1-15 DO YOU USE OR REFER TO CAPACITOR COLOR CODES	30	33	35
C 107	C1-16 DO YOU WORK WITH CAPACITORS IN DC CIRCUITS	72	81	65
C 108	C1-17 DO YOU WORK WITH CAPACITORS IN AC CIRCUITS	73	79	69
C 109	C1-18 DO YOU WORK WITH CAPACITORS IN CIRCUITS WITH BOTH DC AND AC	65	69	65
C 110	C1-19 DO YOU WORK WITH CAPACITORS IN DON'T REMEMBER WHICH CIRCUITS	18	12	23
C 111	C1-20 DO YOU CALCULATE CAPACITANCE FOR PARTICULAR CAPACITORS USING FORMULAS	1	2	0
C 112	C1-21 DO YOU USE OR REFER TO THE GENERAL RULE THAT CAPACITANCE OF A CAPACITOR IS DIRECTLY PROPORTIONAL TO THE DIELECTRIC CONSTANT	3	4	8
C 113	C1-22 DO YOU USE OR REFER TO THE GENERAL RULE THAT CAPACITANCE OF A CAPACITOR IS INVERSELY PROPORTIONAL TO THE DIELECTRIC THICKNESS	3	4	4
C 114	C1-23 DO YOU CALCULATE THE TOTAL CAPACITANCE OF CAPACITORS IN SERIES	14	8	35
C 115	C1-24 DO YOU CALCULATE THE TOTAL CAPACITANCE OF CAPACITORS IN PARALLEL	12	6	31
C 116	C1-25 DO YOU CALCULATE THE TOTAL CAPACITANCE OF CAPACITORS IN SERIES-PARALLEL CIRCUITS	12	6	31
C 117	C1-26 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT DOES NOT FLOW THROUGH CAPACITORS, IT ONLY APPEARS TO DO SO	16	17	23
C 118	C1-27 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT LEADS VOLTAGE IN AC CAPACITOR CIRCUITS	17	17	31
C 119	C1-28 DO YOU USE OR REFER TO THE GENERAL RULE THAT CAPACITIVE REACTANCE IS INVERSELY PROPORTIONAL TO FREQUENCY	7	6	15
C 120	C1-29 DO YOU CALCULATE CAPACITIVE REACTANCE	7	6	19

CAPACITORS AND
CAPACITIVE REACTANCE

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
C 121	C1-30 DO YOU WORK WITH ROTOR-STATOR (VARIABLE) CAPACITORS	27	19	38	
C 122	C1-31 DO YOU WORK WITH COMPRESSION (TRIMMER) CAPACITORS	22	23	35	
C 123	C1-32 DO YOU WORK WITH ELECTROLYTIC (FIXED) CAPACITORS	64	75	58	
C 124	C1-33 DO YOU WORK WITH PAPER (FIXED) CAPACITORS	47	58	46	
C 125	C1-34 DO YOU WORK WITH MICA (FIXED) CAPACITORS	46	50	50	
C 126	C1-35 DO YOU WORK WITH CERAMIC (FIXED) CAPACITORS	59	69	58	
C 127	C1-36 DO YOU WORK WITH DON'T REMEMBER WHICH TYPE OF CAPACITORS	25	27	19	
C 128	C2-01 DO YOU WORK WITH TRANSFORMERS IN YOUR PRESENT JOB	63	67	65	
C 129	C2-02 DO YOU INSPECT TRANSFORMERS	66	77	69	
C 130	C2-03 DO YOU CLEAN TRANSFORMERS	37	44	23	
C 131	C2-04 DO YOU ADJUST TRANSFORMERS	36	42	38	
C 132	C2-05 DO YOU TROUBLESHOOT TRANSFORMERS	60	67	62	
C 133	C2-06 DO YOU REMOVE OR REPLACE COMPLETE TRANSFORMERS	63	71	62	
C 134	C2-07 DO YOU REMOVE OR REPLACE TRANSFORMER PARTS, SUCH AS THE PRIMARY WINDING	6	6	8	
C 135	C2-08 DO YOU MAKE A DISTINCTION BETWEEN MUTUAL INDUCTION AND MUTUAL INDUCTANCE (M)	2	2	0	
C 136	C2-09 DO YOU USE THE SYMBOL FOR MUTUAL INDUCTANCE, M	3	2	4	
C 137	C2-10 DO YOU REFER TO OR USE THE COEFFICIENT OF COUPLING WHEN WORKING WITH TRANSFORMERS	3	6	4	TRANSFORMERS
C 138	C2-11 DO YOU CALCULATE TURNS RATIOS FOR TRANSFORMERS USING CURRENT OR VOLTAGE RATIOS	3	4	0	
C 139	C2-12 DO YOU REFER TO REFLECTED IMPEDANCE WHEN WORKING WITH TRANSFORMERS	2	2	4	
C 140	C2-13 DO YOU CALCULATE IMPEDANCE INTERACTIONS FOR TRANSFORMERS	1	0	4	
C 141	C2-14 DO YOU WORK WITH AUTOTRANSFORMERS	26	33	38	
C 142	C2-15 DO YOU WORK WITH POWER TRANSFORMERS	60	65	62	
C 143	C2-16 DO YOU WORK WITH AUDIO TRANSFORMERS	11	2	27	
C 144	C2-17 DO YOU WORK WITH RADIO FREQUENCY TRANSFORMERS	30	27	42	
C 145	C2-18 DO YOU WORK WITH DON'T REMEMBER WHAT TYPE OF TRANSFORMERS	23	27	19	
C 146	C2-19 DO YOU CHECK TRANSFORMERS FOR OPEN WINDINGS BY MEASURING RESISTANCE	60	69	62	
C 147	C2-20 DO YOU CHECK TRANSFORMERS FOR SHORTED WINDINGS BY MEASURING RESISTANCE	58	67	65	
C 148	C2-21 DO YOU CHECK TRANSFORMERS FOR SHORTED WINDINGS BY MEASURING OUTPUT VOLTAGES	59	67	62	
C 149	C2-22 DO YOU MEASURE RESISTANCE OF TRANSFORMER WINDINGS TO DETERMINE WHETHER A TRANSFORMER HAS A STEP-UP OR STEP-DOWN TURNS RATIO	17	17	15	
C 150	C2-23 DO YOU MEASURE OUTPUT VOLTAGE OF TRANSFORMERS TO DETERMINE WHETHER A TRANSFORMER HAS A STEP-UP OR STEP-DOWN TURNS RATIO	27	29	27	
C 151	C2-24 DO YOU REFER TO BASIC TRANSFORMER SCHEMATIC SYMBOLS FOR TRANSFORMERS	69	81	73	

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TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029	
C 152	C2-25 DO YOU REFER TO MULTIPLE SECONDARY-WINDINGS SCHEMATIC SYMBOLS FOR TRANSFORMERS	52	58	62	
C 153	C2-26 DO YOU REFER TO MULTIPLE TAP SCHEMATIC SYMBOLS FOR TRANSFORMERS	56	63	62	
C 154	C2-27 DO YOU REFER TO CENTER TAP SCHEMATIC SYMBOLS FOR TRANSFORMERS	58	65	65	
C 155	C2-28 DO YOU REFER TO AIR CORE SCHEMATIC SYMBOLS FOR TRANSFORMERS	24	29	23	
C 156	C2-29 DO YOU REFER TO IRON CORE SCHEMATIC SYMBOLS FOR TRANSFORMERS	26	31	27	
C 157	C2-30 DO YOU REFER TO COMBINATIONS OF THE ABOVE SCHEMATIC SYMBOLS FOR TRANSFORMERS	47	44	50	
C 158	C2-31 DO YOU DETERMINE PHASE RELATIONSHIPS BETWEEN SECONDARY AND PRIMARY VOLTAGES OF TRANSFORMERS USING SCHEMATIC SYMBOLS	25	23	19	
C 159	C2-32 DO YOU DETERMINE OR REFER TO THE TYPE OF CORE IN TRANSFORMERS YOU WORK WITH	9	12	4	
C 160	C2-33 DO YOU REFER TO OR USE THE GENERAL RULE THAT THE TURNS RATIO OF A TRANSFORMER IS EQUAL TO THE VOLTAGE RATIO	8	8	12	
C 161	C2-34 DO YOU USE OR REFER TO STEP-UP OR STEP-DOWN RATIOS FOR TRANSFORMERS	19	21	12	
C 162	C2-35 DO YOU CALCULATE VOLTAGE RATIOS FOR TRANSFORMERS USING TURNS RATIOS	4	4	4	
C 163	C2-36 DO YOU CALCULATE CURRENT RATIOS FOR TRANSFORMERS USING TURNS RATIOS	3	2	0	
C 164	C2-37 DOES YOUR JOB INVOLVE ANY TASKS DEALING WITH THREE PHASE TRANSFORMERS	35	29	46	
C 165	C2-38 DO YOU INSPECT THREE PHASE TRANSFORMERS	30	29	42	
C 166	C2-39 DO YOU CLEAN OR LUBRICATE THREE PHASE TRANSFORMERS	11	13	8	
C 167	C2-40 DO YOU ADJUST THREE PHASE TRANSFORMERS	13	10	19	
C 168	C2-41 DO YOU TROUBLESHOOT THREE PHASE TRANSFORMERS	26	25	35	
C 169	C2-42 DO YOU REMOVE OR REPLACE COMPLETE THREE PHASE TRANSFORMERS	28	23	38	
C 170	C2-43 DO YOU REMOVE OR REPLACE THREE PHASE TRANSFORMER PARTS SUCH AS WINDINGS	2	2	0	
C 171	C3-01 DO YOU USE OR REFER TO PERMANENT MAGNETS	59	67	62	
C 172	C3-02 DO YOU USE OR REFER TO TEMPORARY MAGNETS	25	21	31	
C 173	C3-03 DO YOU USE OR REFER TO RETENTIVITY OF MAGNETIC MATERIALS	6	2	8	
C 174	C3-04 DO YOU USE OR REFER TO RELUCTANCE OF MAGNETIC MATERIALS	4	0	8	MAGNETISM
C 175	C3-05 DO YOU USE OR REFER TO PERMEABILITY OF MAGNETIC MATERIALS	4	2	0	
C 176	C3-06 DO YOU USE OR REFER TO RESIDUAL MAGNETISM	4	0	4	
C 177	C3-07 DO YOU USE OR REFER TO MAGNETIC LINES OF FORCE OR FLUX	18	19	19	
C 178	C3-08 DO YOU USE OR REFER TO WEBER'S THEORY OF MAGNETISM	1	0	0	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029
C 179	C3-09 DO YOU USE OR REFER TO DOMAIN THEORY OF MAGNETISM	1	0	0
C 180	C3-10 DO YOU USE OR REFER TO MAGNETIC INDUCTION	15	15	19
C 181	C3-11 DO YOU USE OR REFER TO FLUX DENSITY	3	2	4
C 182	C3-12 DO YOU USE OR REFER TO THE GENERAL RULE THAT FOR MAGNETIC POLES, LIKE POLES REPEL AND UNLIKE POLES ATTRACT	34	35	35
C 183	C3-13 DO YOU USE THE LEFT HAND THUMB RULE TO FIND THE DIRECTION OF MAGNETIC FIELDS ABOUT STRAIGHT WIRES	9	13	4
C 184	C3-14 DO YOU USE THE LEFT HAND THUMB RULE TO FIND THE NORTH POLE OF A CURRENT CARRYING COIL	8	12	4
D 185	D1-01 DO YOU WORK WITH RC, LR, RCL CIRCUITS IN YOUR PRESENT JOB	31	31	35
D 186	D1-02 DO YOU USE OR REFER TO VECTORS WHEN WORKING WITH RCL CIRCUITS	3	4	4
D 187	D1-03 DO YOU USE OR REFER TO PYTHAGOREAN THEOREM WHEN WORKING WITH RCL CIRCUITS	1	0	4
D 188	D1-04 DO YOU USE OR REFER TO SINE WHEN WORKING WITH RCL CIRCUITS	7	6	4
D 189	D1-05 DO YOU USE OR REFER TO COSINE WHEN WORKING WITH RCL CIRCUITS	6	6	0
D 190	D1-06 DO YOU USE OR REFER TO TANGENT WHEN WORKING WITH RCL CIRCUITS	3	2	0
D 191	D1-07 DO YOU USE OR REFER TO WATTS WHEN WORKING WITH RCL CIRCUITS	17	13	23
D 192	D1-08 DO YOU USE OR REFER TO TRUE POWER (PT) WHEN WORKING WITH RCL CIRCUITS	6	6	4
D 193	D1-09 DO YOU USE OR REFER TO MAXIMUM POWER (PM) WHEN WORKING WITH RCL CIRCUITS	9	10	8
D 194	D1-10 DO YOU USE OR REFER TO AVERAGE POWER (PAVE) WHEN WORKING WITH RCL CIRCUITS	11	13	12
D 195	D1-11 DO YOU USE OR REFER TO APPARENT POWER (PA) WHEN WORKING WITH RCL CIRCUITS	3	2	4
D 196	D1-12 DO YOU USE OR REFER TO POWER FACTOR (PF) WHEN WORKING WITH RCL CIRCUITS	6	6	4
D 197	D1-13 DO YOU USE OR REFER TO RESONANT CIRCUITS WHEN WORKING WITH RCL CIRCUITS	20	21	19
D 198	D1-14 DO YOU USE OR REFER TO BANDWIDTH WHEN WORKING WITH RCL CIRCUITS	26	25	23
D 199	D1-15 DO YOU USE OR REFER TO SELECTIVITY WHEN WORKING WITH RCL CIRCUITS	18	17	12
D 200	D1-16 DO YOU USE OR REFER TO RESONANT FREQUENCY WHEN WORKING WITH RCL CIRCUITS	24	25	23
D 201	D1-17 DO YOU USE OR REFER TO HALF POWER POINTS WHEN WORKING WITH RCL CIRCUITS	2	2	0
D 202	D1-18 DO YOU USE OR REFER TO BANDPASS REGION WHEN WORKING WITH RCL CIRCUITS	11	8	8
D 203	D1-19 DO YOU USE OR REFER TO CIRCUIT Q WHEN WORKING WITH RCL CIRCUITS	4	2	0

RCL CIRCUITS

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TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029
D 204	D1-20 DO YOU USE OR REFER TO TANK CIRCUITS WHEN WORKING WITH RCL CIRCUITS	18	19	15
D 205	D1-21 DO YOU DETERMINE VALUES OF TRIGONOMETRIC FUNCTIONS USING FORMULAS	0	0	0
D 206	D1-22 DO YOU DRAW VOLTAGE, CURRENT, OR IMPEDANCE VECTOR DIAGRAMS FOR CIRCUITS	2	0	0
D 207	D1-23 DO YOU CALCULATE TOTAL IMPEDANCE FOR CAPACITIVE CIRCUITS	4	2	8
D 208	D1-24 DO YOU CALCULATE PHASE ANGLES BETWEEN IMPEDANCE AND RESISTANCE IN CAPACITIVE CIRCUITS	0	0	0
D 209	D1-25 DO YOU CALCULATE TOTAL IMPEDANCE FOR SERIES RCL CIRCUITS	1	0	0
D 210	D1-26 DO YOU CALCULATE IMPEDANCE ANGLES FOR SERIES RCL CIRCUITS	1	0	0
D 211	D1-27 DO YOU CALCULATE APPARENT POWER (PA) FOR SERIES RCL CIRCUITS	1	0	0
D 212	D1-28 DO YOU CALCULATE TRUE POWER (PT) FOR SERIES RCL CIRCUITS	1	0	0
D 213	D1-29 DO YOU CALCULATE POWER FACTORS (PF) FOR SERIES RCL CIRCUITS	1	0	0
D 214	D1-30 DO YOU CALCULATE TOTAL CURRENT FOR PARALLEL RCL CIRCUITS	3	2	4
D 215	D1-31 DO YOU CALCULATE IMPEDANCE ANGLES FOR PARALLEL RCL CIRCUITS	1	0	0
D 216	D1-32 DO YOU CALCULATE TOTAL IMPEDANCE FOR PARALLEL RCL CIRCUITS USING THE ASSUMED VOLTAGE METHOD	1	0	0
D 217	D1-33 DO YOU CALCULATE TOTAL IMPEDANCE FOR PARALLEL RCL CIRCUITS USING OHM'S LAW	2	0	4
D 218	D1-34 DO YOU CHECK CAPACITORS USING OHMMETERS	26	19	42
D 219	D1-35 DO YOU CHECK CAPACITORS USING SUBSTITUTION	14	10	23
D 220	D1-36 DO YOU CHECK INDUCTORS USING OHMMETERS	21	17	38
D 221	D1-37 DO YOU CHECK INDUCTORS USING SUBSTITUTION	12	10	19
D 222	D1-38 DO YOU USE OR REFER TO THE GENERAL RULE THAT THETA= 0, PF = 1, AND PA = PT FOR RESONANT CIRCUITS	0	0	0
D 223	D1-39 DO YOU CALCULATE RESONANT FREQUENCIES FOR RCL CIRCUITS	7	4	4
D 224	D1-40 DO YOU USE OR REFER TO THE GENERAL RULE THAT IMPEDANCE IS MINIMUM AND CURRENT MAXIMUM AT THE RESONANT FREQUENCY FOR SERIES RCL CIRCUITS	3	4	8
D 225	D1-41 DO YOU USE OR REFER TO THE GENERAL RULE THAT LINE CURRENT IS MINIMUM AND IMPEDANCE MAXIMUM AT RESONANT FREQUENCY FOR PARALLEL RCL CIRCUITS	2	4	0
D 226	D1-42 DO YOU USE OR REFER TO THE GENERAL RULE THAT HALF POWER POINTS ARE AT 70.7 PERCENT OF THE PEAK CURRENT VALUE	5	8	0
D 227	D1-43 DO YOU USE OR REFER TO THE GENERAL RULE THAT BANDWIDTH IS INVERSELY PROPORTIONAL TO Q	1	2	0
D 228	D1-44 DO YOU DETERMINE HOW CHANGES IN FREQUENCY, RESISTANCE , CAPACITANCE, OR INDUCTANCE WILL AFFECT CURRENT OR PHASE ANGLES FOR RCL CIRCUITS	2	4	0

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029	
D 229	D2-01 IN YOUR PRESENT JOB, DO YOU WORK WITH, USE, OR REFER TO SERIES OR PARALLEL RESONANT CIRCUITS OR TIME CONSTANTS	15	13	15	
D 230	D2-02 DO YOU WORK WITH, USE, OR REFER TO TIME CONSTANTS	12	13	12	SERIES AND PARALLEL RESONANCE (TIME CONSTANTS)
D 231	D2-03 DO YOU WORK WITH, USE, OR REFER TO AVAILABLE VOLTAGE	3	4	4	
D 232	D3-04 DO YOU WORK WITH, USE, OR REFER TO TRANSIENT INTERVALS	1	0	0	
D 233	D2-05 DO YOU USE OR REFER TO THE GENERAL RULE THAT A CAPACITOR IS FULLY CHARGED (OR DISCHARGED) AFTER FIVE (5) TIME CONSTANTS (TC)	4	2	8	
D 234	D2-06 DO YOU USE OR REFER TO UNIVERSAL TIME CONSTANT CHARTS	0	0	0	
D 235	D2-07 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE CIRCUIT CURRENT OR COMPONENT VOLTAGES AFTER A SPECIFIC TIME FOR RC OR LR CIRCUITS	0	0	0	
D 236	D2-08 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE THE TIME REQUIRED FOR CIRCUIT CURRENT OR COMPONENT VOLTAGES TO REACH SPECIFIC VALUES FOR RC OR LR CIRCUITS	0	0	0	
D 237	D2-09 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE COMPONENT VALUES REQUIRED FOR CIRCUIT CURRENT AND COMPONENT VOLTAGES TO REACH SPECIFIC VALUES IN SPECIFIC TIMES	0	0	0	
D 238	D2-10 DO YOU USE OR REFER TO THE GENERAL RULE THAT CURRENT IN LR CIRCUITS REACHES ITS MINIMUM VALUE (OR ZERO) AFTER FIVE (5) TIME CONSTANTS	1	2	0	
D 239	D3-01 DO YOU WORK WITH CIRCUITS USED AS FILTERS IN YOUR PRESENT JOB	43	40	54	
D 240	D3-02 DO YOU INSPECT FILTER CIRCUITS	33	33	42	
D 241	D3-03 DO YOU CLEAN FILTER CIRCUITS	19	25	15	
D 242	D3-04 DO YOU ALIGN OR ADJUST FILTER CIRCUITS	21	19	23	
D 243	D3-05 DO YOU TROUBLESHOOT TO THE FILTER CIRCUIT LEVEL	35	35	42	
D 244	D3-06 DO YOU TROUBLESHOOT TO COMPONENT PARTS	32	27	42	FILTERS
D 245	D3-07 DO YOU REMOVE OR REPLACE THE COMPLETE FILTER CIRCUIT	35	33	50	
D 246	D3-08 DO YOU REMOVE OR REPLACE FILTER CIRCUIT COMPONENT PARTS	25	17	38	
D 247	D3-09 DO YOU WORK WITH LOW PASS FILTERS	18	17	19	
D 248	D3-10 DO YOU WORK WITH HIGH PASS FILTERS	17	17	15	
D 249	D3-11 DO YOU WORK WITH BANDPASS FILTERS	17	13	12	
D 250	D3-12 DO YOU WORK WITH BAND-REJECT FILTERS	9	8	8	
D 251	D3-13 DON'T REMEMBER WHICH TYPE OF FILTER YOU WORK WITH	22	23	23	
D 252	D3-14 DO YOU WORK WITH L-SECTION FILTER CONFIGURATION	9	6	15	
D 253	D3-15 DO YOU WORK WITH T-SECTION FILTER CONFIGURATION	7	6	12	
D 254	D3-16 DO YOU WORK WITH PI-SECTION FILTER CONFIGURATION	6	6	8	
D 255	D3-17 DON'T REMEMBER WHICH TYPE FILTER CONFIGURATION	30	33	27	
D 256	D3-18 DO THE FILTERS YOU WORK WITH USE PARALLEL RESONANT CIRCUITS	15	13	12	
D 257	D3-19 DO THE FILTERS YOU WORK WITH USE SERIES-PARALLEL CIRCUITS	16	15	12	
D 258	D3-20 DO THE FILTERS YOU WORK WITH USE SERIES RESONANT CIRCUITS	16	15	12	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC D26	SPC D28	SPC D29	
D 259	D3-21 DON'T REMEMBER WHICH TYPE OF BASIC CIRCUIT	26	27	35	
D 260	D3-22 DO YOU USE EQUATIONS OR FORMULAS TO DETERMINE CAPACITANCE OR INDUCTANCE VALUES REQUIRED FOR SPECIFIC FILTERS	1	0	0	
E 261	E1-01 DO YOU WORK WITH COUPLING DEVICES IN YOUR PRESENT JOB	33	35	27	
E 262	E1-02 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH RC COUPLING	28	27	23	
E 263	E1-03 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH IMPEDANCE COUPLING	24	27	15	
E 264	E1-04 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH TRANSFORMER COUPLING	27	31	23	
E 265	E1-05 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM RC COUPLING	28	27	27	
E 266	E1-06 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM IMPEDANCE COUPLING	21	23	15	
E 267	E1-07 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM TRANSFORMER COUPLING	25	29	23	
E 268	E1-08 DO YOU WORK WITH DIRECTLY COUPLED CIRCUITS	17	17	12	
E 269	E1-09 DO YOU WORK WITH CAPACITIVE-RESISTIVE COUPLED CIRCUITS	18	19	15	
E 270	E1-10 DO YOU WORK WITH CAPACITIVE-INDUCTIVE COUPLED CIRCUITS	17	17	15	
E 271	E1-11 DO YOU WORK WITH TRANSFORMER COUPLED CIRCUITS	20	21	19	
E 272	E1-12 DON'T REMEMBER WHICH TYPE OF COUPLING CIRCUITS	17	19	15	
E 273	E2-01 IN YOUR PRESENT JOB, DO YOU PERFORM SOLDERING TECHNIQUES OR INSPECT OR EVALUATE SOLDERED CONNECTIONS	91	88	100	
E 274	E2-02 DO YOU SELECT TYPE OF SOLDER TO USE	69	69	69	
E 275	E2-03 DO YOU ADD FLUX TO CONNECTIONS	83	90	81	
E 276	E2-04 DO YOU CLEAN CONNECTIONS USING SOLVENTS	63	69	50	
E 277	E2-05 DO YOU STRIP INSULATION FROM WIRES	93	94	96	
E 278	E2-06 DO YOU CONNECT OR DISCONNECT HEAT SINKS	73	73	85	
E 279	E2-07 DO YOU BEND OR SHAPE WIRES OR LEADS	88	92	96	
E 280	E2-08 DO YOU CUT WIRES	92	92	96	
E 281	E2-09 DO YOU FILE OR SHAPE SOLDERING IRON TIPS	74	83	69	
E 282	E2-10 DO YOU TIN SOLDERING IRON TIPS	85	92	88	
E 283	E2-11 DO YOU CLEAN SOLDERING IRON TIPS	68	92	88	
E 284	E2-12 DO YOU CLEAN ELECTRICAL SURFACES USING ERASERS	48	52	62	
E 285	E2-13 DO YOU TIN OR PRE-TIN CONDUCTORS	83	88	85	
E 286	E2-14 DO YOU INSPECT SOLDERED CONNECTIONS	93	94	100	
E 287	E2-15 DO YOU DESOLDER CONNECTIONS BY WICKING	45	56	35	
E 288	E2-16 DO YOU DESOLDER CONNECTIONS USING VACUUM DESOLDERING TOOLS	67	71	62	
E 289	E2-17 DO YOU CUT COMPONENT LEADS TO REMOVE COMPONENTS	70	71	69	
E 290	E2-18 DO YOU CRUSH COMPONENTS FOR REMOVAL	16	21	8	

COUPLING

SOLDERING

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029	
E 291	E2-19 DO YOU MAKE HARDWIRE CONNECTIONS	82	85	85	
E 292	E2-20 DO YOU MAKE PRINTED CIRCUIT BOARD CONNECTIONS	54	50	62	
E 293	E2-21 DO YOU SOLDER PASSIVE COMPONENTS SUCH AS RESISTORS OR CAPACITORS ON PRINTED CIRCUIT BOARDS	53	44	62	
E 294	E2-22 DO YOU SOLDER ACTIVE COMPONENTS SUCH AS SOLID-STATE DIODES OR TRANSISTORS ON PRINTED CIRCUIT BOARDS	39	21	54	
E 295	E3-01 DO YOU WORK WITH RELAYS ON YOUR PRESENT JOB	83	90	92	
E 296	E3-02 DO YOU ADJUST RELAYS	45	58	62	
E 297	E3-03 DO YOU CLEAN RELAYS	49	56	65	
E 298	E3-04 DO YOU INSPECT RELAYS	67	79	77	
E 299	E3-05 DO YOU REMOVE OR REPLACE COMPLETE RELAYS	77	87	77	
E 300	E3-06 DO YOU REMOVE OR REPLACE PARTS OR RELAYS	20	17	46	
E 301	E3-07 DO YOU TROUBLESHOOT RELAYS	76	77	85	
E 302	E3-08 DO YOU STRAIGHTEN RELAY CONTACTS	48	54	69	RELAYS
E 303	E3-09 DO YOU PERFORM TASKS ON RELAY CONTACTS	38	44	65	
E 304	E3-10 DO YOU PERFORM TASKS ON RELAY CORES	10	6	27	
E 305	E3-11 DO YOU PERFORM TASKS ON RELAY COILS	12	10	31	
E 306	E3-12 DO YOU PERFORM TASKS ON RELAY ARMATURES	20	15	50	
E 307	E3-13 DO YOU PERFORM TASKS ON RELAY SPRINGS	22	15	62	
E 308	E3-14 DO YOU USE OR REFER TO SINGLE POLE, SINGLE THROW (SPST), NORMALLY OPEN (NO) SCHEMATIC SYMBOLS FOR RELAYS	69	77	69	
E 309	E3-15 DO YOU USE OR REFER TO SINGLE POLE, SINGLE THROW (SPST), NORMALLY CLOSED (NC) SCHEMATIC SYMBOLS FOR RELAYS	67	75	65	
E 310	E3-16 DO YOU USE OR REFER TO SINGLE POLE, DOUBLE THROW (SPDT) SCHEMATIC SYMBOLS FOR RELAYS	66	77	65	
E 311	E3-17 DO YOU USE OR REFER TO DOUBLE POLE, DOUBLE THROW (DPDT) SCHEMATIC SYMBOLS FOR RELAYS	67	77	69	
E 312	E3-18 DO YOU USE OR REFER TO OTHER RELAY SYMBOLS SCHEMATIC SYMBOLS FOR RELAYS	66	65	77	
E 313	E3-19 DO YOU CHECK ELECTRICAL CONTINUITY OF COILS BY MEASURING RESISTANCE	60	60	73	
F 314	F1-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH MICROPHONES	10	13	4	
F 315	F1-02 DO YOU INSPECT MICROPHONES	2	2	4	
F 316	F1-03 DO YOU CLEAN MICROPHONES	0	0	0	
F 317	F1-04 DO YOU OPERATE MICROPHONES	10	15	4	MICROPHONES
F 318	F1-05 DO YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS BUT DO NOT TROUBLESHOOT DOWN TO COMPONENT PARTS OR MICROPHONES	3	6	0	
F 319	F1-06 DO YOU TROUBLESHOOT DOWN TO MICROPHONE PARTS	1	0	0	
F 320	F1-07 DO YOU REMOVE OR REPLACE COMPLETE MICROPHONES	4	6	4	
F 321	F1-08 DO YOU REMOVE OR REPLACE MICROPHONE PARTS	1	0	0	
F 322	F1-09 DO YOU PERFORM TASKS ON CARBON MICROPHONES	1	2	0	
F 323	F1-10 DO YOU PERFORM TASKS ON CAPACITOR MICROPHONES	0	0	0	
F 324	F1-11 DO YOU PERFORM TASKS ON CRYSTAL MICROPHONES	1	0	4	
F 325	F1-12 DO YOU PERFORM TASKS ON DYNAMIC MICROPHONES	2	4	0	
F 326	F1-13 DO YOU PERFORM TASKS ON VELOCITY RIBBON MICROPHONES	0	0	0	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029	
F 327	F2-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH SPEAKERS	3	2	0	
F 328	F2-02 DO YOU INSPECT SPEAKERS	0	0	0	
F 329	F2-03 DO YOU CLEAN SPEAKERS	0	0	0	
F 330	F2-04 DO YOU OPERATE SPEAKERS	2	2	0	
F 331	F2-05 DO YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS BUT DO NOT TROUBLESHOOT DOWN TO COMPONENT PARTS OF SPEAKERS	0	0	0	SPEAKERS
F 332	F2-06 DO YOU TROUBLESHOOT DOWN TO SPEAKER PARTS	0	0	0	
F 333	F2-07 DO YOU REMOVE OR REPLACE COMPLETE SPEAKERS	0	0	0	
F 334	F2-08 DO YOU REMOVE OR REPLACE SPEAKER PARTS	0	0	0	
F 335	F2-09 DO YOU PERFORM ANY TASKS ON SPEAKER CONES	0	0	0	
F 336	F2-10 DO YOU PERFORM ANY TASKS ON SPEAKER SPIDERS	0	0	0	
F 337	F2-11 DO YOU PERFORM ANY TASKS ON SPEAKER FIELD COILS	0	0	0	
F 338	F2-12 DO YOU PERFORM ANY TASKS ON SPEAKER VOICE COILS	0	0	0	
F 339	F2-13 DO YOU PERFORM ANY TASKS ON SPEAKER PERMANENT MAGNETS	0	0	0	
F 340	F2-14 DO YOU PERFORM ANY TASKS ON SPEAKER ELECTROMAGNETS	0	0	0	
F 341	F2-15 DO YOU PERFORM ANY TASKS ON SPEAKER SOFT IRON CORES	0	0	0	
F 342	F3-01 DO YOU USE OSCILLOSCOPES IN YOUR PRESENT JOB	83	88	85	
F 343	F3-02 DO YOU USE OSCILLOSCOPES TO PERFORM OPERATIONAL CHECKS	80	85	77	
F 344	F3-03 DO YOU USE OSCILLOSCOPES TO PERFORM ALIGNMENTS OR ADJUSTMENTS	84	94	77	
F 345	F3-04 DO YOU USE OSCILLOSCOPES TO TROUBLESHOOT ELECTRONIC CIRCUITS	81	85	81	
F 346	F3-05 DO YOU USE OSCILLOSCOPES TO MEASURE FREQUENCY	77	79	77	OSCILLOSCOPES
F 347	F3-06 DO YOU USE OSCILLOSCOPES TO MEASURE TIME	77	90	77	
F 348	F3-07 DO YOU USE OSCILLOSCOPES TO OBSERVE LISAJOUS PATTERNS	27	33	19	
F 349	F3-08 DO YOU USE OSCILLOSCOPES TO OBSERVE SIGNALS WHILE UTILIZING ATTENUATOR PROBES	69	71	54	
F 350	F3-09 DO YOU USE OSCILLOSCOPES TO MAKE FREQUENCY OR TIME MEASUREMENTS USING DELAY TIME MULTIPLIERS	39	50	38	
F 351	F3-10 DO YOU USE OSCILLOSCOPES TO MEASURE AC VOLTAGE	76	79	73	
F 352	F3-11 DO YOU USE OSCILLOSCOPES TO MEASURE OR OBSERVE SIGNALS AFTER FIRST ADJUSTING THE GAIN AND DC BAL CONTROLS	62	67	58	
F 353	F3-12 DO YOU USE OSCILLOSCOPES TO MEASURE DC VOLTAGE	71	75	62	
G 354	G1-01 DO YOU WORK WITH SEMICONDUCTOR DIODES IN YOUR PRESENT JOB	48	44	50	
G 355	G1-02 DO YOU INSPECT DIODES	42	42	46	
G 356	G1-03 DO YOU REMOVE OR REPLACE DIODES	44	44	42	
G 357	G1-04 DO YOU CHECK DIODES USING AN INSTRUMENT	44	40	46	
G 358	G1-05 DO YOU USE ENERGY LEVEL DIAGRAMS IN YOUR WORK WITH DIODES	0	0	0	SEMICONDUCTOR DIODES
G 359	G1-06 DO YOU USE PN JUNCTION DIODE CHARACTERISTIC CURVES, TOGETHER WITH VALUES OF FORWARD AND REVERSE BIAS VOLTAGE, TO COMPUTE FORWARD OR REVERSE LIAS RESISTANCE	1	0	4	
G 360	G1-07 DO YOU COMPUTE FORWARD OR REVERSE BIAS RESISTANCE FOR DIODES	10	12	12	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029
G 361	G1-08 DO YOU USE OR REFER TO THE GENERAL RULE THAT TEMPERATURE CAN AFFECT THE OPERATION OF DIODES	25	23	23
G 362	G1-09 DO YOU IDENTIFY SEMICONDUCTOR DIODES AS OPPOSED TO OTHER ELECTRONIC COMPONENTS, SUCH AS RESISTORS, BASED ON THEIR PHYSICAL APPEARANCE	40	38	42
G 363	G1-10 DO YOU REFER TO OR DO YOU DETERMINE THE GENERAL EFFECTS OF DOPING ON CURRENT FLOW	3	2	4
G 364	G1-11 DO YOU USE OR REFER TO MEASUREMENTS OF FORWARD BIAS RESISTANCE	21	17	27
G 365	G1-12 DO YOU USE OR REFER TO DIODE COLOR CODING	20	13	35
G 366	G1-13 DO YOU USE OR REFER TO CENTRIFUGAL FORCE OF AN ELECTRON IN ORBIT AROUND A NUCLEUS	0	0	0
G 367	G1-14 DO YOU USE OR REFER TO CENTRIPETAL FORCE OF AN ELECTRON IN ORBIT AROUND A NUCLEUS	0	0	0
G 368	G1-15 DO YOU USE OR REFER TO DIODE NUMBERING SYSTEM, SUCH AS 1N 538	27	29	31
G 369	G1-16 DO YOU USE OR REFER TO KINETIC ENERGY OF AN ELECTRON MOVING IN ORBIT	0	0	0
G 370	G1-17 DO YOU USE OR REFER TO POTENTIAL ENERGY OF AN ELECTRON MOVING IN ORBIT	0	0	0
G 371	G1-18 DO YOU USE OR REFER TO MEASUREMENTS OF REVERSE BIAS RESISTANCE	17	13	23
G 372	G1-19 DO YOU USE OR REFER TO NUMBER OF ELECTRONS IN A PARTICULAR SHELL OR ORBIT	0	0	0
G 373	G1-20 DO YOU USE OR REFER TO PERMISSIBLE ENERGY LEVELS OF AN ORBITING ELECTRON	0	0	0
G 374	G1-21 DO YOU USE OR REFER TO FORBIDDEN ENERGY LEVELS OF AN ORBITING ELECTRON	0	0	0
G 375	G1-22 DO YOU USE OR REFER TO VALENCE ELECTRONS (THOSE IN THE OUTERMOST SHELL)	0	0	0
G 376	G1-23 DO YOU USE OR REFER TO ATOMIC NUMBER (TOTAL NUMBER OF ELECTRONS IN ATOM)	0	0	0
G 377	G1-24 DO YOU USE OR REFER TO SYMBOLS ON THE DIODE WHICH INDICATE THE CATHODE END	33	37	31
G 378	G1-25 DO YOU NEED TO KNOW WHICH MATERIALS ARE USED IN THE CONSTRUCTION OF DIODES SUCH AS GERMANIUM OR SILICON	7	6	15
G 379	G1-26 DO YOU NEED TO KNOW THAT SEMICONDUCTORS HAVE NEGATIVE TEMPERATURE COEFFICIENTS OF RESISTANCE (AS TEMPERATURE INCREASES RESISTANCE DECREASES)	9	6	8
G 380	G1-27 DO YOU USE OR REFER TO PN JUNCTION DIODE CHARACTERISTIC CURVES, SUCH AS VOLTAGE - CURRENT CHARACTERISTIC CURVES (PERHAPS YOU DO THIS TO IDENTIFY POINTS OF STRUCTURAL BREAKDOWN OR OPERATING REGIONS)	1	0	0
G 381	G1-28 DO YOU DETERMINE WHETHER PN JUNCTION DIODES ARE FORWARD BIASED OR REVERSE BIASED WHEN YOU READ OR INTERPRET CIRCUIT DIAGRAMS	17	13	23
G 382	G1-29 DO YOU USE OR REFER TO VALENCE BAND IN SEMICONDUCTOR MATERIALS	2	0	4

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS GPSM11 PAGE 15

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

DY-TSK		SPC 026	SPC 028	SPC 029
G 383	G1-30 DO YOU USE OR REFER TO FORBIDDEN BAND IN SEMICONDUCTOR MATERIALS	0	0	0
G 384	G1-31 DO YOU USE OR REFER TO CONDUCTION BAND IN SEMICONDUCTOR MATERIALS	1	0	4
G 385	G1-32 DO YOU USE OR REFER TO COVALENT BONDING IN SEMICONDUCTOR MATERIALS	0	0	0
G 386	G1-33 DO YOU USE OR REFER TO ELECTRON-HOLE PAIR CREATED IN SEMICONDUCTORS	0	0	0
G 387	G1-34 DO YOU USE OR REFER TO ELECTRON FLOW OR HOLE FLOW IN SEMICONDUCTORS	2	4	0
G 388	G1-35 DO YOU USE OR REFER TO DONOR IMPURITY IN SEMICONDUCTORS	0	0	0
G 389	G1-36 DO YOU USE OR REFER TO ACCEPTOR IMPURITY IN SEMICONDUCTORS	0	0	0
G 390	G1-37 DO YOU USE OR REFER TO P-TYPE SEMICONDUCTOR MATERIAL	3	0	0
G 391	G1-38 DO YOU USE OR REFER TO N-TYPE SEMICONDUCTOR MATERIAL	3	0	0
G 392	G1-39 DO YOU USE OR REFER TO MAJORITY CARRIERS IN SEMICONDUCTORS	0	0	0
G 393	G1-40 DO YOU USE OR REFER TO MINORITY CARRIERS IN SEMICONDUCTORS	0	0	0
G 394	G1-41 DO YOU USE OR REFER TO JUNCTION RECOMBINATION IN SEMICONDUCTORS	0	0	0
G 395	G1-42 DO YOU USE OR REFER TO DEPLETION REGION IN SEMICONDUCTORS	0	0	0
G 396	G1-43 DO YOU USE OR REFER TO RELATIONSHIP BETWEEN BARRIER WIDTH AND DIFFERENCE OF POTENTIAL	0	0	0
G 397	G1-44 DO YOU USE OR REFER TO THE 10:1 BACK TO FRONT RESISTANCE RATIO FOR DIODES	17	21	15
G 398	G1-45 DO YOU USE OR REFER TO BARRIER HEIGHT IN SEMICONDUCTORS	0	0	0
G 399	G1-46 DO YOU USE OR REFER TO DIODE SUBSTITUTION INFORMATION	9	6	15
G 400	G1-47 DO YOU USE OR REFER TO MAXIMUM AVERAGE FORWARD CURRENT DIODE RATINGS	3	2	8
G 401	G1-48 DO YOU USE OR REFER TO PEAK RECURRENT FORWARD CURRENT DIODE RATINGS	1	0	4
G 402	G1-49 DO YOU USE OR REFER TO MAXIMUM SURGE CURRENT DIODE RATINGS	2	2	4
G 403	G1-50 DO YOU USE OR REFER TO PEAK REVERSE (INVERSE) VOLTAGE DIODE RATINGS	3	0	12
G 404	G2-01 DO YOU WORK WITH TRANSISTORS IN YOUR PRESENT JOB.	36	25	46
G 405	G2-02 DO YOU INSPECT TRANSISTORS	30	21	46
G 406	G2-03 DO YOU REMOVE OR REPLACE TRANSISTORS	25	10	38
G 407	G2-04 DO YOU CHECK TRANSISTORS USING AN INSTRUMENT	25	10	35
G 408	G2-05 DO YOU USE OR REFER TO EMITTER - BASE (EB) FORWARD AND REVERSE RESISTANCE MEASUREMENTS	16	2	19
G 409	G2-06 DO YOU USE OR REFER TO COLLECTOR - BASE (CB) FORWARD AND REVERSE RESISTANCE MEASUREMENTS	16	2	19

TRANSISTORS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029
G 410	62-07 DO YOU USE OR REFER TO EMITTER - COLLECTOR (EC) RESISTANCE MEASUREMENTS	16	2	19
G 411	62-08 DO YOU USE OR REFER TO HOW BIASING AFFECTS THE PHYSICAL BARRIER WIDTH OF THE EMITTER - BASE JUNCTION	7	0	12
G 412	62-09 DO YOU USE OR REFER TO HOW BIASING AFFECTS THE PHYSICAL BARRIER WIDTH OF THE COLLECTOR - BASE JUNCTION	7	0	12
G 413	62-10 DO YOU USE OR REFER TO THE PHYSICAL SIZE OF THE TRANSISTOR STRUCTURE (COLLECTOR, BASE AND EMITTER)	10	2	12
G 414	62-11 DO YOU USE OR REFER TO LEAKAGE CURRENT (ICBO) IN A TRANSISTOR	5	0	8
G 415	62-12 DO YOU USE OR REFER TO TRANSISTOR SCHEMATIC SYMBOLS	30	17	42
G 416	62-13 DO YOU USE OR REFER TO TRANSISTOR NOTATION SUCH AS Q1, Q2, Q3, ETC	27	12	38
G 417	62-14 DO YOU USE OR REFER TO TRANSISTOR SUBSTITUTION INFORMATION	10	4	19
G 418	62-15 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE TRANSISTOR BASE CURRENT IB IS NORMALLY SIGNIFICANTLY SMALLER THAN THE EMITTER CURRENT IE (USUALLY IB BEING 2 TO 8 PERCENT OF IE)	1	0	0
G 419	62-16 DO YOU USE THE INFORMATION THAT THE EFFECT OF EMITTER BASE VOLTAGE ON BASE CURRENT IS THE CONTROLLING FACTOR FOR TRANSISTORS	7	2	15
G 420	62-17 DO YOU USE THE GENERAL RULE THAT LEAKAGE CURRENT (ICBO) IN A TRANSISTOR INCREASES AS TEMPERATURE INCREASES	2	0	4
G 421	62-18 DO YOU USE OR REFER TO TRANSISTOR CHARACTERISTIC CURVES	2	0	4
G 422	62-19 DO YOU USE OR REFER TO BETA TRANSISTOR GAINS	1	0	4
G 423	62-20 DO YOU USE OR REFER TO ALPHA TRANSISTOR GAINS	1	0	4
G 424	62-21 DO YOU USE OR REFER TO GAMMA TRANSISTOR GAINS	1	0	4
G 425	62-22 DO YOU CALCULATE BETA TRANSISTOR GAINS	0	0	0
G 426	62-23 DO YOU CALCULATE ALPHA TRANSISTOR GAINS	0	0	0
G 427	62-24 DO YOU CALCULATE GAMMA TRANSISTOR GAINS	0	0	0
G 428	63-01 DO YOU WORK WITH TRANSISTOR AMPLIFIERS IN YOUR PRESENT JOB	20	6	38
G 429	63-02 DO YOU INSPECT TRANSISTOR AMPLIFIERS	14	4	31
G 430	63-03 DO YOU ALIGN OR ADJUST TRANSISTOR AMPLIFIERS	13	2	31
G 431	63-04 DO YOU TROUBLESHOOT TO THE AMPLIFIER CIRCUIT LEVEL	14	2	27
G 432	63-05 DO YOU TROUBLESHOOT TO AMPLIFIER COMPONENTS	10	2	19
G 433	63-06 DO YOU REMOVE OR REPLACE THE COMPLETE AMPLIFIER	16	2	38
G 434	63-07 DO YOU REMOVE OR REPLACE AMPLIFIER COMPONENTS	10	2	23
G 435	63-08 DO YOU USE OR REFER TO (COMMON EMITTER) THE CHANGE IN COLLECTOR CURRENT WHICH RESULTS FROM A CHANGE IN BASE CURRENT	3	0	0
G 436	63-09 DO YOU USE OR REFER TO (COMMON EMITTER) THE CALCULATIONS NECESSARY TO MEASURE THE SPECIFIC CHANGE IN COLLECTOR CURRENT WHICH RESULTS FROM A SPECIFIC CHANGE IN BASE CURRENT	1	0	0

TRANSISTOR AMPLIFIERS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

BY-TSK	SPC 026	SPC 028	SPC 029
G 437 G3-10 DO YOU USE OR REFER TO (COMMON EMITTER) THE CHANGE IN COLLECTOR VOLTAGE WHICH RESULTS FROM A CHANGE IN BASE CURRENT	3	0	0
G 438 G3-11 DO YOU USE OR REFER TO (COMMON EMITTER) THE CALCULATIONS NECESSARY TO MEASURE THE SPECIFIC CHANGE IN COLLECTOR VOLTAGE WHICH RESULTS FROM A SPECIFIC CHANGE IN BASE CURRENT	0	0	0
G 439 G3-12 DO YOU USE OR REFER TO (COMMON EMITTER) THE CHANGE IN BASE CURRENT WHICH RESULTS FROM AN INPUT SIGNAL	3	0	4
G 440 G3-13 DO YOU USE OR REFER TO (COMMON EMITTER) THE CALCULATIONS NECESSARY TO MEASURE THE SPECIFIC CHANGE IN BASE CURRENT WHICH RESULTS FROM A SPECIFIC INPUT SIGNAL	0	0	0
G 441 G3-14 DO YOU USE THE LOAD-LINE METHOD OF ANALYSIS IN YOUR CIRCUIT ANALYSIS (THIS METHOD REQUIRES YOU TO PLOT A LOAD-LINE ON A TRANSISTOR CHARACTERISTIC CURVE)	0	0	0
G 442 G3-15 DO YOU USE OR REFER TO THE OPERATING POINT Q (QUIESCENT POINT) FOR A TRANSISTOR	1	0	0
G 443 G3-16 DO YOU CALCULATE THE SPECIFIC QUIESCENT POINT FOR A PARTICULAR TRANSISTOR	1	0	0
G 444 G3-17 DO YOU MEASURE VOLTAGE GAIN USED IN THE COMMON EMITTER CONFIGURATION	8	0	15
G 445 G3-18 DO YOU MEASURE CURRENT GAIN USED IN THE COMMON EMITTER CONFIGURATION	4	0	8
G 446 G3-19 DO YOU MEASURE POWER GAIN USED IN THE COMMON EMITTER CONFIGURATION	5	0	8
G 447 G3-20 DO YOU CALCULATE THE VOLTAGE GAIN FOR SPECIFIC TRANSISTORS USING A FORMULA THAT IS, DO YOU DIVIDE THE CHANGE IN BASE-EMITTER VOLTAGE INTO THE CHANGE THE BASE COLLECTOR VOLTAGE TO DETERMINE THE VOLTAGE GAIN	1	0	0
G 448 G3-21 DO YOU CALCULATE THE CURRENT GAIN FOR SPECIFIC TRANSISTORS USING A FORMULA THAT IS, DO YOU DIVIDE THE CHANGE IN BASE CURRENT INTO THE CHANGE IN COLLECTOR CURRENT TO DETERMINE THE CURRENT GAIN	1	0	0
G 449 G3-22 DO YOU CALCULATE THE POWER GAIN FOR A SPECIFIC TRANSISTOR USING A FORMULA THAT IS, DO YOU MULTIPLY THE CURRENT GAIN TIMES THE VOLTAGE GAIN TO DETERMINE THE POWER GAIN	1	0	0
G 450 G3-23 DO YOU NEED TO KNOW THAT MORE COLLECTOR CURRENT IS GENERATED WITH LESS COLLECTOR VOLTAGE AS TEMPERATURE INCREASES (THIS AFFECTS THE STATIC OPERATING POINT [Q] OF THE TRANSISTOR)	0	0	0
G 451 G3-24 DO YOU COMPUTE THE STATIC OPERATING POINT [Q] OF A TRANSISTOR AT DIFFERENT TEMPERATURES	1	0	0
G 452 G3-25 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH EMITTER (SWAMPING) RESISTOR STABILIZATION	3	0	8
G 453 G3-26 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH SELF-BIAS STABILIZATION	4	0	8

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029
G 454	63-27 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH THERMISTOR STABILIZATION	4	0	4
G 455	63-28 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH FORWARD BIAS DIODE STABILIZATION	8	0	15
G 456	63-29 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH REVERSE BIAS DIODE STABILIZATION	8	0	15
G 457	63-30 DO YOU IDENTIFY ON SCHEMATIC DIAGRAMS AND RELATE TO THE ACTUAL CIRCUITRY THE COMPONENTS ASSOCIATED WITH DOUBLE DIODE STABILIZATION	5	0	8
G 458	63-31 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM EMITTER (SWAMPING) RESISTOR STABILIZATION	5	0	15
G 459	63-32 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM SELF-BIAS STABILIZATION	5	0	12
G 460	63-33 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM THERMISTOR STABILIZATION	6	0	12
G 461	63-34 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM FORWARD BIAS DIODE STABILIZATION	7	0	15
G 462	63-35 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM REVERSE BIAS DIODE STABILIZATION	7	0	15
G 463	63-36 DO YOU TROUBLESHOOT CIRCUITS WHICH HAVE COMPONENTS WHICH PERFORM DOUBLE DIODE STABILIZATION	6	0	12
G 464	63-37 DO YOU IDENTIFY AMPLITUDE DISTORTION FOR TRANSISTOR CIRCUITS	6	0	12
G 465	63-38 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE CAUSES OF AMPLITUDE DISTORTION	7	0	12
G 466	63-39 DO YOU IDENTIFY FREQUENCY DISTORTION FOR TRANSISTOR CIRCUITS	8	0	12
G 467	63-40 DO YOU IDENTIFY PHASE DISTORTION FOR TRANSISTOR CIRCUITS	7	0	8
G 468	63-41 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE CAUSES OF PHASE DISTORTION	5	0	4
G 469	63-42 DO YOU TROUBLESHOOT TRANSISTOR CIRCUITS TO FIND THE CAUSES OF FREQUENCY DISTORTION	7	0	12
G 470	63-43 DO YOU NEED TO KNOW THE DEGENERATIVE EFFECTS ON THE CIRCUIT CAUSED BY CHANGING EMITTER RESISTANCE FOR TRANSISTOR AMPLIFIERS IN THE COMMON COLLECTOR CONFIGURATION	1	0	0
G 471	63-44 DO YOU DETERMINE THE CLASS OF OPERATION FOR AMPLIFIERS IN ORDER TO TROUBLESHOOT AMPLIFIER CIRCUITS	4	0	12
G 472	63-45 DO YOU TROUBLESHOOT OR REPAIR PARAPHASE AMPLIFIERS	4	0	4
G 473	63-46 DO YOU TROUBLESHOOT OR REPAIR PUSH-PULL AMPLIFIERS	9	0	15
G 474	63-47 DO YOU TROUBLESHOOT OR REPAIR COMPLEMENTARY SYMMETRY CIRCUITS	3	0	4
G 475	63-48 DO YOU TROUBLESHOOT OR REPAIR COMPOUND-CONNECTED AMPLIFIERS	4	0	8

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029	
G 476	G3-49 DO YOU TROUBLESHOOT OR REPAIR CASCADE-CONNECTED AMPLIFIERS	4	0	4	
H 477	H1-01 DO YOU USE OR REFER TO VARACTORS	3	0	12	
H 478	H1-02 DO YOU USE OR REFER TO TUNNEL DIODES	1	0	0	
H 479	H1-03 DO YOU USE OR REFER TO FIELD EFFECT TRANSISTORS (FET)	7	4	12	SOLID-STATE SPECIAL PURPOSE DEVICES
H 480	H1-04 DO YOU USE OR REFER TO UNIJUNCTION TRANSISTORS	7	4	8	
H 481	H1-05 DO YOU USE OR REFER TO ZENER DIODES	30	19	38	
H 482	H1-06 DO YOU USE OR REFER TO INTEGRATED CIRCUITS	30	17	31	
H 483	H2-01 IN YOUR PRESENT JOB, DO YOU WORK WITH POWER SUPPLIES	79	90	73	
H 484	H2-02 DO YOU INSPECT POWER SUPPLIES	71	85	73	
H 485	H2-03 DO YOU CLEAN POWER SUPPLIES	50	62	38	
H 486	H2-04 DO YOU ALIGN OR ADJUST POWER SUPPLIES	70	90	58	
H 487	H2-05 DO YOU TROUBLESHOOT TO POWER SUPPLY CIRCUIT LEVEL	68	77	69	
H 488	H2-06 DO YOU TROUBLESHOOT TO POWER SUPPLY COMPONENTS	63	77	58	
H 489	H2-07 DO YOU REMOVE OR REPLACE COMPLETE POWER SUPPLIES	60	90	73	
H 490	H2-08 DO YOU REMOVE OR REPLACE POWER SUPPLY COMPONENTS	55	71	46	
H 491	H2-09 DO YOU WORK WITH HALF-WAVE RECTIFIERS	45	56	38	
H 492	H2-10 DO YOU WORK WITH FULL-WAVE RECTIFIERS OTHER THAN BRIDGE RECTIFIERS	48	58	42	
H 493	H2-11 DO YOU WORK WITH BRIDGE RECTIFIERS	49	56	50	
H 494	H2-12 DO YOU WORK WITH THREE-PHASE RECTIFIERS	40	46	35	
H 495	H2-13 DO YOU USE OR REFER TO INPUT VOLTAGE	65	73	77	
H 496	H2-14 DO YOU USE OR REFER TO INPUT FREQUENCY	37	42	35	
H 497	H2-15 DO YOU USE OR REFER TO PEAK OUTPUT VOLTAGE	57	63	58	POWER SUPPLIES
H 498	H2-16 DO YOU USE OR REFER TO AVERAGE OUTPUT VOLTAGE	60	69	65	
H 499	H2-17 DO YOU USE OR REFER TO RIPPLE AMPLITUDE	56	71	38	
H 500	H2-18 DO YOU USE OR REFER TO RIPPLE FREQUENCY	35	38	31	
H 501	H2-19 DO YOU USE OR REFER TO PEAK REVERSE (INVERSE) VOLTAGE	24	23	23	
H 502	H2-20 DO YOU USE OR REFER TO SHAPE OF OUTPUT WAVEFORMS	48	46	50	
H 503	H2-21 DO YOU USE OR REFER TO EFFECTIVE OUTPUT VOLTAGE	56	60	65	
H 504	H2-22 DO YOU WORK WITH CIRCUITS WHICH EMPLOY CAPACITIVE FILTERS	30	37	27	
H 505	H2-23 DO YOU WORK WITH CIRCUITS WHICH EMPLOY INDUCTIVE FILTERS	27	29	27	
H 506	H2-24 DO YOU WORK WITH CIRCUITS WHICH EMPLOY CAPACITIVE INPUT L-TYPE FILTERS	20	21	19	
H 507	H2-25 DO YOU WORK WITH CIRCUITS WHICH EMPLOY INDUCTIVE INPUT L-TYPE FILTERS	19	19	19	
H 508	H2-26 DO YOU WORK WITH CIRCUITS WHICH EMPLOY LC PI-TYPE FILTERS	16	17	15	
H 509	H2-27 DO YOU WORK WITH CIPCUITS WHICH EMPLOY RC PI-TYPE FILTERS	16	17	15	
H 510	H2-28 DO YOU WORK WITH CIRCUITS WHICH EMPLOY DON'T REMEMBER WHICH TYPE OF FILTER	42	48	31	
H 511	H2-29 DO YOU HAVE THE OPTION OF REPLACING ONE TYPE OF FILTER WITH A DIFFERENT TYPE FILTER	0	0	0	
H 512	H3-01 DO YOU WORK WITH OSCILLATORS IN YOUR PRESENT JOB	38	50	27	OSCILLATORS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
M 513	M3-02 DO YOU INSPECT OSCILLATORS	24	33	19
M 514	M3-03 DO YOU ALIGN OR ADJUST OSCILLATORS	29	40	19
M 515	M3-04 DO YOU REMOVE OR REPLACE COMPLETE OSCILLATORS	30	42	23
M 516	M3-05 DO YOU REMOVE OR REPLACE OSCILLATOR COMPONENTS	17	21	15
M 517	M3-06 DO YOU TROUBLESHOOT TO OSCILLATOR CIRCUIT LEVEL	30	42	19
M 518	M3-07 DO YOU TROUBLESHOOT TO OSCILLATOR COMPONENTS	22	31	15
M 519	M3-08 DO YOU USE OR REFER TO FEEDBACK	27	37	19
M 520	M3-09 DO YOU USE OR REFER TO FREQUENCY DETERMINING DEVICES (FDD)	19	25	19
M 521	M3-10 DO YOU USE OR REFER TO AMPLITUDE STABILITY	17	17	15
M 522	M3-11 DO YOU USE OR REFER TO FREQUENCY STABILITY	23	25	19
M 523	M3-12 DO YOU USE OR REFER TO DAMPING	17	23	15
M 524	M3-13 DO YOU USE OR REFER TO REGENERATIVE FEEDBACK	15	21	4
M 525	M3-14 DO YOU USE OR REFER TO PIEZOELECTRIC EFFECT	3	4	0
M 526	M3-15 DO YOU USE OR REFER TO CRITICAL DAMPING	6	10	0
M 527	M3-16 DO YOU USE OR REFER TO UNDER DAMPING	10	10	8
M 528	M3-17 DO YOU USE OR REFER TO OVER DAMPING	10	10	8
M 529	M3-18 DO YOU WORK WITH OSCILLATORS WHICH USE LC TANK CIRCUITS AS FDD	14	15	8
M 530	M3-19 DO YOU WORK WITH OSCILLATORS WHICH USE RC NETWORKS AS FDD	18	23	8
M 531	M3-20 DO YOU WORK WITH OSCILLATORS WHICH USE CRYSTALS AS FDD	30	40	15
M 532	M3-21 DO YOU WORK WITH OSCILLATORS WHICH USE DON'T REMEMBER WHICH TYPE OF FDD	10	6	12
M 533	M3-22 DO YOU WORK WITH SERIES HARTLEY SINUSOIDAL OSCILLATORS	8	8	4
M 534	M3-23 DO YOU WORK WITH SHUNT HARTLEY SINUSOIDAL OSCILLATORS	7	8	0
M 535	M3-24 DO YOU WORK WITH COLPITTS SINUSOIDAL OSCILLATORS	9	10	4
M 536	M3-25 DO YOU WORK WITH CLAPP SINUSOIDAL OSCILLATORS	5	6	0
M 537	M3-26 DO YOU WORK WITH BUTLER SINUSOIDAL OSCILLATORS	5	6	0
M 538	M3-27 DO YOU WORK WITH DON'T REMEMBER WHICH TYPE OF OSCILLATORS	19	23	15
I 539	I1-01 DO YOU WORK WITH MULTIVIBRATORS IN YOUR PRESENT JOB	33	46	15
I 540	I1-02 DO YOU INSPECT WAVE GENERATING OR SHAPING CIRCUITS	24	31	15
I 541	I1-03 DO YOU ALIGN OR ADJUST WAVE GENERATING OR SHAPING CIRCUITS	25	33	15
I 542	I1-04 DO YOU CALIBRATE WAVE GENERATING OR SHAPING CIRCUITS	20	25	15
I 543	I1-05 DO YOU TROUBLESHOOT TO WAVE GENERATING OR SHAPING CIRCUITS	28	38	15
I 544	I1-06 DO YOU TROUBLESHOOT TO WAVE GENERATING OR SHAPING CIRCUIT COMPONENTS	25	35	12
I 545	I1-07 DO YOU REMOVE OR REPLACE COMPLETE WAVE GENERATING OR SHAPING CIRCUITS	25	33	15
I 546	I1-08 DO YOU REMOVE OR REPLACE WAVE GENERATING OR SHAPING COMPONENTS	23	31	12
I 547	I1-09 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN LC TANK CIRCUITS	15	17	4

MULTIVIBRATORS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029	
I S48	I1-10 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN RC NETWORKS	17	21	4	
I S49	I1-11 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN CRYSTALS	22	31	8	
I S50	I1-12 DO YOU WORK WITH MULTIVIBRATORS WHICH CONTAIN DON'T REMEMBER WHICH TYPE OF FDD	10	15	4	
I S51	I1-13 DO YOU WORK WITH ASTABLE MULTIVIBRATORS	8	6	0	
I S52	I1-14 DO YOU WORK WITH MONOSTABLE MULTIVIBRATORS	13	10	8	
I S53	I1-15 DO YOU WORK WITH BISTABLE MULTIVIBRATORS	13	8	12	
I S54	I1-16 DO YOU WORK WITH DON'T REMEMBER WHICH TYPE MULTIVIBRATORS	17	33	0	
I S55	I2-01 DO YOU WORK WITH LIMITERS OR CLAMPERS IN YOUR PRESENT JOB	30	33	23	
I S56	I2-02 DO YOU WORK WITH SERIES DIODE LIMITERS	13	10	12	
I S57	I2-03 DO YOU WORK WITH SHUNT DIODE LIMITERS	11	12	4	
I S58	I2-04 DO YOU WORK WITH LIMITERS WITH BIAS	12	15	4	LIMITERS AND CLAMPERS
I S59	I2-05 DO YOU WORK WITH ZENER DIODE LIMITERS	17	12	8	
I S60	I2-06 DO YOU WORK WITH TRANSISTOR LIMITERS	9	6	4	
I S61	I2-07 DO YOU WORK WITH DON'T KNOW WHICH TYPE OF LIMITERS	16	15	15	
I S62	I2-08 DO YOU WORK WITH BASIC DIODE CLAMPING CIRCUITS	9	10	0	
I S63	I2-09 DO YOU WORK WITH DIODE CLAMPING CIRCUITS WITH BIAS	7	8	4	
I S64	I2-10 DO YOU WORK WITH DON'T KNOW WHICH TYPE OF CLAMPING CIRCUIT	20	21	15	
I S65	I3-01 IN YOUR PRESENT JOB, DO YOU WORK ON EQUIPMENT WHICH CONTAINS ELECTRON TUBES	73	90	69	
I S66	I3-02 DO YOU CHECK ELECTRON TUBES TO SEE IF THEY ARE GOOD	64	90	50	
I S67	I3-03 DO YOU USE TUBE TESTERS TO CHECK ELECTRON TUBES	57	90	38	
I S68	I3-04 DO YOU USE MULTIMETERS TO CHECK ELECTRON TUBES	31	38	42	
I S69	I3-05 DO YOU USE SCOPES TO CHECK ELECTRON TUBES	39	42	38	
I S70	I3-06 DO YOU USE SUBSTITUTION TO CHECK ELECTRON TUBES	55	77	46	
I S71	I3-07 DO YOU USE OR REFER TO CUTOFF	28	37	23	
I S72	I3-08 DO YOU USE OR REFER TO PEAK INVERSE VOLTAGE RATING	13	21	8	
I S73	I3-09 DO YOU USE OR REFER TO PEAK CURRENT RATING	17	23	15	
I S74	I3-10 DO YOU USE OR REFER TO TRANSIT TIME	12	17	8	ELECTRON TUBES
I S75	I3-11 DO YOU USE OR REFER TO PLATE DISSIPATION RATING	13	19	4	
I S76	I3-12 DO YOU USE OR REFER TO SATURATION	23	33	19	
I S77	I3-13 DO YOU USE OR REFER TO DC PLATE RESISTANCE	20	31	12	
I S78	I3-14 DO YOU COMPUTE ACTUAL VALUES OF THE DC PLATE RESISTANCE FOR ELECTRON TUBES	0	0	0	
I S79	I3-15 DO YOU USE OR REFER TO PLATE VOLTAGE	43	56	38	
I S80	I3-16 DO YOU USE OR REFER TO PLATE CURRENT	38	50	31	
I S81	I3-17 DO YOU USE OR REFER TO GRID VOLTAGE	43	54	38	
I S82	I3-18 DO YOU USE OR REFER TO GRID CURRENT	37	48	31	
I S83	I3-19 DO YOU USE OR REFER TO CATHODE VOLTAGE	43	54	38	
I S84	I3-20 DO YOU USE OR REFER TO CATHODE CURRENT	38	50	31	
I S85	I3-21 DO YOU USE OR REFER TO THE TRIODE AMPLIFICATION FACTOR (THE AMPLIFICATION FACTOR FOR TRIODES IS DEFINED AS THE RATIO OF CHANGE IN PLATE VOLTAGE TO A CHANGE IN GRID VOLTAGE)	3	4	0	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
I 586	I3-22 DO YOU CALCULATE ACTUAL VALUES OF TRIODE AMPLIFICATION FACTORS	0	0	0
I 587	I3-23 DO YOU USE OR REFER TO MULTIGRID (TETRODE, PENTODE, ETC) AMPLIFICATION FACTORS	3	6	0
I 588	I3-24 DO YOU USE OR REFER TO ELECTRON TUBE TRANSCONDUCTANCE (G, WHICH IS MEASURED IN MHOS)	1	2	0
I 589	I3-25 DO YOU CALCULATE ACTUAL VALUES OF ELECTRON TUBE TRANSCONDUCTANCES	1	0	0
I 590	I3-26 DO YOU USE OR REFER TO THE ELECTRON TUBE PARAMETER CALLED AC PLATE RESISTANCE	2	2	0
I 591	I3-27 DO YOU CALCULATE ACTUAL VALUES OF AC PLATE RESISTANCE	0	0	0
I 592	I3-28 DO YOU USE OR REFER TO ELECTRON TUBE INTERELECTRODE CAPACITANCE	1	0	4
I 593	I3-29 DO YOU USE OR REFER TO CHARACTERISTIC CURVES IN YOUR WORK WITH ELECTRON TUBES	2	0	4
I 594	I3-30 DO YOU USE CHARACTERISTIC CURVES TO SELECT PLATE VOLTAGE FOR A SPECIFIED BIAS	5	6	4
I 595	I3-31 DO YOU USE CHARACTERISTIC CURVES TO SELECT PLATE CURRENT FOR A SPECIFIED BIAS	5	8	4
I 596	I3-32 DO YOU USE CHARACTERISTIC CURVES TO SELECT BIAS REQUIRED FOR CUTOFF	6	8	8
I 597	I3-33 DO YOU USE CHARACTERISTIC CURVES TO SELECT BIAS REQUIRED FOR SATURATION	4	6	4
I 598	I3-34 DO YOU USE OR REFER TO ELECTRON TUBE AMPLIFIER GAIN	30	40	23
I 599	I3-35 DO YOU USE OR REFER TO ELECTRON TUBE AMPLIFIER EFFICIENCY	19	25	8
I 600	I3-36 DO YOU USE TEST TUBE CHECKERS TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	32	54	12
I 601	I3-37 DO YOU USE MULTIMETERS TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	23	25	31
I 602	I3-38 DO YOU USE OSCILLOSCOPES TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	26	23	27
I 603	I3-39 DO YOU USE CHARACTERISTIC CURVES TO DETERMINE ELECTRON TUBE AMPLIFIER GAIN	3	4	0
I 604	I3-40 DO YOU CALCULATE ANY ELECTRON TUBE CAPACITANCES SUCH AS INPUT CAPACITANCE	2	2	4
I 605	I3-41 DO YOU USE OR REFER TO TUBE SOCKET NOTATION	47	63	42
I 606	I3-42 DO YOU USE OR REFER TO PIN NUMBERING SYSTEMS	47	62	46
I 607	I3-43 DO YOU USE OR REFER TO THE TYPE OF MATERIAL OR THE OPERATING TEMPERATURE OF THE EMITTING SURFACE IN THE ELECTRON TUBES YOU WORK ON	6	8	8
I 608	I3-44 DO YOU USE OR REFER TO TUBE SUBSTITUTION MATERIAL SUCH AS MANUALS OR CHARTS	27	40	27
J 609	J1-01 DO YOU WORK WITH ELECTRON TUBE AMPLIFIERS OR CIRCUITS IN YOUR PRESENT JOB	49	67	38
J 610	J1-02 DO YOU DETERMINE THE CLASS OF OPERATION FOR ELECTRON TUBE AMPLIFIERS IN ORDER TO TROUBLESHOOT AMPLIFIER CIRCUITS	9	12	8

ELECTRON TUBE AMPLIFIERS AND CIRCUITS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
J 611	J1-03 DO YOU TROUBLESHOOT OR REPAIR PARAPHASE AMPLIFIERS	8	12	0	
J 612	J1-04 DO YOU TROUBLESHOOT OR REPAIR PUSH-PULL AMPLIFIERS	18	21	23	
J 613	J1-05 DO YOU TROUBLESHOOT OR REPAIR COMPOUND-CONNECTED AMPLIFIERS	10	12	4	
J 614	J1-06 DO YOU TROUBLESHOOT OR REPAIR CASCADE-CONNECTED AMPLIFIERS	11	15	4	
J 615	J1-07 DO YOU TROUBLESHOOT OR REPAIR DON'T KNOW WHICH TYPE OF AMPLIFIER	21	31	15	
J 616	J2-01 DO YOU WORK WITH GAS TUBES (HOT CATHODE OR COLD CATHODE)	46	63	38	
J 617	J2-02 DO YOU WORK WITH CATHODE-RAY TUBES	67	87	62	
J 618	J2-03 DO YOU USE OR REFER TO THE CHARACTERISTICS OF BEAM POWER TUBES	6	8	8	
J 619	J2-04 DO YOU TROUBLESHOOT OR REPAIR CIRCUITS IN WHICH BEAM POWER TUBES ARE USED	13	17	12	
J 620	J2-05 DO YOU USE OR REFER TO THE CHARACTERISTICS OF THYRATRONS	48	63	50	
J 621	J2-06 DO YOU TROUBLESHOOT OR REPAIR CIRCUITS IN WHICH THYRATRONS ARE USED	61	85	50	
J 622	J2-07 DO YOU USE OR REFER TO THE PRINCIPLES OF OPERATION OF ELECTRON GUNS OF CATHODE-RAY TUBES (CRT)	46	58	46	SPECIAL PURPOSE ELECTRON TUBES
J 623	J2-08 DO YOU USE OR REFER TO THE PRINCIPLES OF OPERATION OF ELECTROMAGNETIC DEFLECTION SYSTEMS OF CATHODE-RAY TUBES (CRT)	36	40	35	
J 624	J2-09 DO YOU USE OR REFER TO THE PRINCIPLES OF OPERATION OF ELECTROSTATIC DEFLECTION SYSTEMS OF CATHODE-RAY TUBES (CRT)	35	42	31	
J 625	J2-10 DO YOU USE OR REFER TO PHOSPHOR SCREENS	38	48	42	
J 626	J2-11 DO YOU USE OR REFER TO AQUADAG COATINGS	17	21	15	
J 627	J2-12 DO YOU USE OR REFER TO ELECTRON OPTICS	8	12	0	
J 628	J2-13 DO YOU USE OR REFER TO PERSISTENCE	21	15	31	
J 629	J2-14 DO YOU USE OR REFER TO DECAY TIMES	11	12	12	
J 630	J2-15 DO YOU USE OR REFER TO FLUORESCENCE	17	21	15	
J 631	J2-16 DO YOU USE OR REFER TO PHOSPHORESCENCE	19	23	23	
J 632	J3-01 DO YOU WORK ON TRANSMIT OR RECEIVE SYSTEMS IN YOUR PRESENT JOB	77	90	81	
J 633	J3-02 DO YOU PERFORM TASKS ON FREQUENCY CONVERTERS	67	90	77	
J 634	J3-03 DO YOU PERFORM TASKS ON FREQUENCY MIXERS	57	75	62	HETERODYNING, MODULATION, AND DEMODULATION
J 635	J3-04 DO YOU USE OR REFER TO THE HETERODYNING OF SIGNALS IN YOUR WORK WITH TRANSMIT OR RECEIVE SYSTEMS	41	62	38	
J 636	J3-05 DO YOU PERFORM TASKS ON REACTANCE MODULATORS	22	25	27	
J 637	J3-06 DO YOU PERFORM TASKS ON MODULATED OSCILLATORS	20	39	27	
K 638	K1-01 DO YOU WORK ON AM TRANSMIT OR RECEIVE SYSTEMS IN YOUR PRESENT JOB	9	6	19	
K 639	K1-02 DO YOU INSPECT AM TRANSMIT OR RECEIVE SYSTEMS	5	4	12	AM SYSTEMS
K 640	K1-03 DO YOU CLEAN AM TRANSMIT OR RECEIVE SYSTEMS	3	2	12	
K 641	K1-04 DO YOU ALIGN OR ADJUST AM TRANSMIT OR RECEIVE SYSTEMS	5	2	12	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
K 642	K1-05 DO YOU TROUBLESHOOT TO AM TRANSMIT OR RECEIVE SYSTEMS	5	2	12
K 643	K1-06 DO YOU TROUBLESHOOT TO AM TRANSMIT OR RECEIVE COMPONENTS	5	4	12
K 644	K1-07 DO YOU REMOVE OR REPLACE AM TRANSMIT OR RECEIVE SYSTEMS	5	2	12
K 645	K1-08 DO YOU REMOVE OR REPLACE AM TRANSMIT OR RECEIVE COMPONENTS	6	6	12
K 646	K1-09 DO YOU PERFORM TASKS ON RF OSCILLATORS	6	6	12
K 647	K1-10 DO YOU PERFORM TASKS ON RF AMPLIFIERS	6	6	12
K 648	K1-11 DO YOU PERFORM TASKS ON AUDIO AMPLIFIERS	2	2	4
K 649	K1-12 DO YOU PERFORM TASKS ON POWER AMPLIFIERS	4	4	8
K 650	K1-13 DO YOU PERFORM TASKS ON LOCAL OSCILLATORS	8	8	15
K 651	K1-14 DO YOU PERFORM TASKS ON IF AMPLIFIERS	7	6	15
K 652	K1-15 DO YOU PERFORM TASKS ON DETECTORS	7	6	15
K 653	K1-16 DO YOU PERFORM TASKS ON DON'T REMEMBER WHICH AM STAGE	2	0	4
K 654	K1-17 DO YOU USE OR REFER TO AMPLITUDE STABILIZATION IN TRANSMITTERS	3	2	8
K 655	K1-18 DO YOU USE OR REFER TO FREQUENCY STABILIZATION IN TRANSMITTERS	4	4	8
K 656	K1-19 DO YOU USE OR REFER TO SENSITIVITY OF RECEIVERS	9	10	15
K 657	K1-20 DO YOU USE OR REFER TO SELECTIVITY OF RECEIVERS	7	8	12
K 658	K1-21 DO YOU USE OR REFER TO 2ND HARMONIC DISTORTION	0	0	0
K 659	K1-22 DO YOU USE OR REFER TO BANDPASS DISTORTION	2	0	4
K 660	K1-23 DO YOU USE OR REFER TO SQUARE LAW DISTORTION	0	0	0
K 661	K1-24 DO YOU USE OR REFER TO CO-CHANNEL INTERFERENCE	3	4	4
K 662	K1-25 DO YOU USE OR REFER TO IMAGE FREQUENCIES IN RECEIVERS	1	0	4
K 663	K1-26 DO YOU USE OR REFER TO SIGNAL TO IMAGE RATIOS OR IMAGE REJECTION RATIOS	3	6	4
K 664	K1-27 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH AM TRANSMITTER SCHEMATIC DIAGRAMS	9	8	19
K 665	K1-28 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH AM RECEIVER SCHEMATIC DIAGRAMS	10	10	19
K 666	K2-01 DO YOU WORK WITH FM TRANSMIT OR RECEIVE SYSTEMS IN YOUR PRESENT JOB	17	21	19
K 667	K2-02 DO YOU INSPECT FM TRANSMIT OR RECEIVE SYSTEMS	16	19	15
K 668	K2-03 DO YOU CLEAN FM TRANSMIT OR RECEIVE SYSTEMS	12	15	12
K 669	K2-04 DO YOU ALIGN FM TRANSMIT OR RECEIVE SYSTEMS	15	15	15
K 670	K2-05 DO YOU TROUBLESHOOT TO FM TRANSMIT OR RECEIVE SYSTEMS	17	15	23
K 671	K2-06 DO YOU TROUBLESHOOT TO FM TRANSMIT OR RECEIVE COMPONENTS	16	17	19
K 672	K2-07 DO YOU REMOVE OR REPLACE FM TRANSMIT OR RECEIVE SYSTEMS	16	17	15
K 673	K2-08 DO YOU REMOVE OR REPLACE FM TRANSMIT OR RECEIVE COMPONENTS	16	19	15
K 674	K2-09 DO YOU PERFORM TASKS ON AUDIO AMPLIFIERS	5	8	0
K 675	K2-10 DO YOU PERFORM TASKS ON FREQUENCY MULTIPLIERS	10	15	0

FM SYSTEMS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
K 676	K2-11 DO YOU PERFORM TASKS ON DRIVERS (INTERMEDIATE AMPLIFIERS)	7	6	4	
K 677	K2-12 DO YOU PERFORM TASKS ON POWER AMPLIFIERS	12	12	12	
K 678	K2-13 DO YOU PERFORM TASKS ON RF AMPLIFIERS	16	17	15	
K 679	K2-14 DO YOU PERFORM TASKS ON FREQUENCY CONVERTERS	15	19	12	
K 680	K2-15 DO YOU PERFORM TASKS ON IF AMPLIFIERS	17	19	15	
K 681	K2-16 DO YOU PERFORM TASKS ON LIMITERS	11	15	0	
K 682	K2-17 DO YOU PERFORM TASKS ON FREQUENCY DISCRIMINATORS	15	17	12	
K 683	K2-18 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SCHEMATIC DIAGRAMS OF FM TRANSMITTERS	17	17	19	
K 684	K2-19 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SCHEMATIC DIAGRAMS OF FM RECEIVERS	16	15	19	
K 685	K3-01 DO YOU CONVERT DECIMAL (BASE 10) NUMBERS TO OCTAL (BASE 8) NUMBERS	9	2	4	
K 686	K3-02 DO YOU CONVERT DECIMAL NUMBERS TO BINARY (BASE 2) NUMBERS	7	0	8	
K 687	K3-03 DO YOU CONVERT OCTAL NUMBERS TO DECIMAL NUMBERS	10	0	4	
K 688	K3-04 DO YOU CONVERT OCTAL NUMBERS TO BINARY NUMBERS	8	0	0	NUMBERING SYSTEMS
K 689	K3-05 DO YOU CONVERT BINARY NUMBERS TO DECIMAL NUMBERS	9	2	4	
K 690	K3-06 DO YOU CONVERT BINARY NUMBERS TO OCTAL NUMBERS	8	0	0	
K 691	K3-07 DO YOU ADD BINARY NUMBERS TO GET A SUM	7	2	4	
K 692	K3-08 DO YOU SUBRRACT BINARY NUMBERS USING THE END-AROUND-CARRY METHOD	4	0	0	
K 693	K3-09 DO YOU SUBTRACT BINARY NUMBERS USING THE DIRECT SUBTRACTION METHOD	6	2	0	
K 694	K3-10 DO YOU ADD OCTAL NUMBERS TO GET A SUM	5	0	0	
L 695	L1-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS RELATING TO LOGIC FUNCTIONS	9	0	19	
L 696	L1-02 DO YOU CONSTRUCT TRUTH TABLES FOR AND LOGIC SYMBOLS OR GATES	4	0	4	
L 697	L1-03 DO YOU CONSTRUCT TRUTH TABLES FOR OR LOGIC SYMBOLS OR GATES	4	0	4	
L 698	L1-04 DO YOU CONSTRUCT TRUTH TABLES FOR AND OR OR LOGIC SYMBOLS WITH STATE INDICATORS	4	0	4	
L 699	L1-05 DO YOU CONSTRUCT TRUTH TABLES FOR EXCLUSIVE OR LOGIC SYMBOLS OR GATES	3	0	0	
L 700	L1-06 DO YOU USE OR REFER TO TRUTH TABLES FOR AND LOGIC SYMBOLS OR GATES	3	0	0	LOGIC FUNCTIONS
L 701	K1-07 DO YOU USE OR REFER TO TRUTH TABLES FOR OR LOGIC SYMBOLS OR GATES	3	0	0	
L 702	K1-08 DO YOU USE OR REFER TO TRUTH TABLES FOR AND OR OR LOGIC SYMBOLS WITH STATE INDICATORS	4	0	4	
L 703	L1-09 DO YOU USE OR REFER TO TRUTH TABLES FOR EXCLUSIVE OR LOGIC SYMBOLS	3	0	0	
L 704	L1-10 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR AND GATES	6	0	8	
L 705	L1-11 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR OR GATES	6	0	8	
L 706	L1-12 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR NAND OR NOR GATES	5	0	4	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
L 707	L1-13 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR EXCLUSIVE OR GATES	6	0	8	
L 708	L2-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS RELATING TO BOOLEAN EQUATIONS, LOGIC DIAGRAMS, OR LOGIC CIRCUITS	3	0	4	
L 709	L2-02 DO YOU DRAW LOGIC SYMBOLS FOR DIRECT COUPLED TRANSISTOR LOGIC (DCTL) CIRCUITS	1	0	0	
L 710	L2-03 DO YOU CONSTRUCT TRUTH TABLES FOR CURRENT MODE LOGIC (CML) CIRCUITS	1	0	0	
L 711	L2-04 DO YOU DRAW LOGIC DIAGRAMS FROM GIVEN BOOLEAN EQUATIONS	2	2	0	
L 712	L2-05 DO YOU MEASURE INPUTS OR OUTPUTS OF LOGIC GATES	3	2	0	
L 713	L2-06 DO YOU DEVELOP OR ANALYZE BOOLEAN EQUATIONS IN THE PROCESS OF TROUBLESHOOTING DIGITAL CIRCUITS	2	2	0	
L 714	L2-07 DO YOU ANALYZE LOGIC CIRCUITS BY USING BOOLEAN ALGEBRA	1	0	0	
L 715	L2-08 DO YOU USE OR REFER TO LOGIC SYMBOLS FOR DIRECT COUPLED TRANSISTOR LOGIC (DCTL) CIRCUIT GATES	2	2	0	
L 716	L2-09 DO YOU USE OR REFER TO TRUTH TABLES FOR CURRENT MODE LOGIC (CML) CIRCUITS	2	2	0	
L 717	L2-10 DO YOU USE OR REFER TO LOGIC DIAGRAMS CONSISTING OF MORE THAN ONE GATE	2	0	0	
L 718	L2-11 DO YOU COMPUTE SUM AND CARRY EXPRESSIONS FOR SERIAL HALF OR FULL ADDER LOGIC DIAGRAMS	0	0	0	BOOLEAN EQUATIONS
L 719	L2-12 DO YOU TRACE DATA FLOW THROUGH PARALLEL FULL ADDER LOGIC DIAGRAMS	1	0	0	
L 720	L2-13 DO YOU WORK WITH ASTABLE (FREE RUNNING) MULTIVIBRATORS	3	2	4	
L 721	L2-14 DO YOU WORK WITH BISTABLE (FLIP-FLOP) MULTIVIBRATORS	3	0	8	
L 722	L2-15 DO YOU WORK WITH MONOSTABLE (ONE-SHOT) MULTIVIBRATORS	2	0	0	
L 723	L2-16 DO YOU USE OR REFER TO FLIP-FLOP MULTIVIBRATOR SYMBOLS	1	0	0	
L 724	L2-17 DO YOU USE OR REFER TO SINGLE-SHOT MULTIVIBRATOR SYMBOLS	1	0	0	
L 725	L2-18 DO YOU USE OR REFER TO FLIP-FLOP CIRCUIT DIAGRAMS	1	0	0	
L 726	L2-19 DO YOU USE OR REFER TO FLIP-FLOP TRUTH TABLES	1	0	0	
L 727	L2-20 DO YOU USE OR REFER TO COMPLEMENTED FLIP-FLOP LOGIC SYMBOLS	0	0	0	
L 728	L2-21 DO YOU USE OR REFER TO COMPLEMENTING FLIP-FLOP LOGIC SYMBOLS	0	0	0	
L 729	L2-22 DO YOU MEASURE OUTPUT WAVESHAPES OF LOGIC CIRCUITS	2	0	4	
L 730	L2-23 DO YOU TRACE DATA FLOW THROUGH COMPLEMENTED FLIP-FLOP SCHEMATIC DIAGRAMS	1	0	0	
L 731	L2-24 DO YOU TRACE DATA FLOW THROUGH COMPLEMENTING FLIP-FLOP SCHEMATIC DIAGRAMS	1	0	0	
L 732	L2-25 DO YOU CONSTRUCT TRUTH TABLES FOR J-K FLIP-FLOP LOGIC SYMBOLS	1	0	0	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
L 733	L3-01 DO YOU WORK WITH DIGITAL COUNTERS IN YOUR PRESENT JOB	23	21	38	
L 734	L3-02 DO YOU USE OR REFER TO UP-COUNTERS	9	10	4	
L 735	L3-03 DO YOU USE OR REFER TO DOWN-COUNTERS	8	6	4	
L 736	L3-04 DO YOU USE OR REFER TO SERIAL COUNTERS	5	6	4	
L 737	L3-05 DO YOU USE OR REFER TO PARALLEL COUNTERS	7	2	8	
L 738	L3-06 DO YOU USE OR REFER TO RING COUNTERS	3	4	0	
L 739	L3-07 DO YOU USE OR REFER TO DECADE COUNTERS	10	8	23	
L 740	L3-08 DO YOU USE OR REFER TO COUNT DETECT CIRCUITS	7	2	15	
L 741	L3-09 DO YOU USE OR REFER TO DOWN CLOCKS	4	2	0	
L 742	L3-10 DO YOU USE OR REFER TO UP CLOCKS	3	2	0	
L 743	L3-11 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF UP-COUNTERS HAVING COMPLEMENTED FLIP-FLOPS	3	0	4	
L 744	L3-12 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF SERIAL UP- OR DOWN-COUNTERS HAVING COMPLEMENTING FLIP-FLOPS	2	0	0	
L 745	L3-13 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF DECADE COUNTERS	6	2	19	
L 746	L3-14 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF RING COUNTERS	1	0	0	COUNTERS
L 747	L3-15 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF SERIAL UP-COUNTERS FEEDING A PARALLEL STORAGE REGISTER	3	2	4	
L 748	L3-16 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF SHIFT REGISTERS	3	0	0	
L 749	L3-17 DO YOU TRACE DATA FLOW THROUGH LOGIC DIAGRAMS OF OTHER TYPE OF COUNTERS	9	2	19	
L 750	L3-18 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR UP-COUNTERS HAVING COMPLEMENTED FLIP-FLOPS	3	6	0	
L 751	L3-19 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR SERIAL UP- OR DOWN-COUNTERS HAVING COMPLEMENTING FLIP-FLOPS	2	2	0	
L 752	L3-20 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR SERIAL UP-COUNTERS FEEDING A PARALLEL STORAGE REGISTERS	2	2	0	
L 753	L3-21 DO YOU COMPUTE THE BINARY COUNT AFTER SPECIFIC INPUT PULSES FOR OTHER TYPES OF COUNTERS	2	2	0	
L 754	L3-22 DO YOU CONSTRUCT TRUTH TABLES FROM LOGIC DIAGRAMS OF DECADE COUNTERS	1	2	0	
L 755	L3-23 DO YOU DETERMINE THE STATE OF EACH FLIP-FLOP IN RING COUNTERS FOR SPECIFIC INPUT PULSES	2	2	4	
L 756	L3-24 DO YOU DETERMINE THE APPROPRIATE AND GATE NECESSARY IN COUNT DETECT CIRCUITS TO INDICATE A REQUIRED COUNT	3	2	8	
M 757	M1-01 DO YOU WORK WITH SAWTOOTH WAVE GENERATORS	50	62	38	
M 758	M1-02 DO YOU WORK WITH TRAPEZOIDAL WAVE GENERATORS	16	15	15	
M 759	M1-03 DO YOU WORK WITH PULSED OSCILLATORS WITH REGENERATIVE FEEDBACK	23	25	15	TIMING CIRCUITS
M 760	M1-04 DO YOU WORK WITH PULSED OSCILLATORS WITHOUT REGENERATIVE FEEDBACK	23	23	15	

PCT MBRS RESPONDING 'YES' BY SELECTED GRPS GPSM11 PAGE 28

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
M 761	M1-05 DO YOU WORK WITH BLOCKING OSCILLATORS	49	62	35	
M 762	M1-06 DO YOU USE OR REFER TO RISE TIME	60	75	58	
M 763	M1-07 DO YOU USE OR REFER TO FALL OR FLYBACK TIME	56	73	58	
M 764	M1-08 DO YOU USE OR REFER TO SWEEP TIME	64	79	62	
M 765	M1-09 DO YOU USE OR REFER TO ELECTRICAL LENGTH OF SAWTOOTH WAVEFORMS	44	48	38	
M 766	M1-10 DO YOU USE OR REFER TO PHYSICAL LENGTH OF SAWTOOTH WAVEFORMS	41	38	38	
M 767	M1-11 DO YOU USE OR REFER TO LINEAR SLOPE OF SAWTOOTH WAVEFORMS	44	44	38	
M 768	M1-12 DO YOU USE OR REFER TO GATE LENGTH OF SAWTOOTH WAVEFORMS	46	48	46	
M 769	M2-01 DO YOU USE SIGNAL GENERATORS IN YOUR PRESENT JOB	31	38	31	
M 770	M2-02 DO YOU PERFORM OPERATIONAL CHECKS WHILE USING SIGNAL GENERATORS	32	40	31	
M 771	M2-03 DO YOU PERFORM PERIODIC MAINTENANCE SUCH AS ADJUSTING, ALIGNING, OR CALIBRATING WHILE USING SIGNAL GENERATORS	24	37	15	
M 772	M2-04 DO YOU TROUBLESHOOT TO AN ASSEMBLY OR SUBASSEMBLY WHILE USING SIGNAL GENERATORS	26	38	12	
M 773	M2-05 DO YOU TROUBLESHOOT TO THE SMALLEST REPLACEABLE COMPONENT WHILE USING SIGNAL GENERATORS	20	33	12	USE OF SIGNAL GENERATORS
M 774	M2-06 DO YOU USE AUDIO SINE-WAVE GENERATORS	7	2	15	
M 775	M2-07 DO YOU USE AUDIO NON-SINUSOIDAL WAVE GENERATORS SUCH AS SQUARE WAVE, TRIANGLE, PULSE, OR SPIKE	10	6	15	
M 776	M2-08 DO YOU USE RF GENERATORS LESS THAN 1,000 MH	9	8	4	
M 777	M2-09 DO YOU USE RF GENERATORS GREATER THAN 1,000 MH	18	23	12	
M 778	M2-10 DO YOU USE OTHER SPECIAL PURPOSE OR MULTI-FUNCTION GENERATORS	18	21	15	
M 779	M3-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY TASKS DEALING WITH ALTERNATING CURRENT OR DIRECT CURRENT MOTORS OR GENERATORS	54	71	58	
M 780	M3-02 DO YOU INSPECT MOTORS	50	71	50	
M 781	M3-03 DO YOU CLEAN OR LUBRICATE MOTORS	39	62	35	
M 782	M3-04 DO YOU OPERATE MOTORS	50	71	50	
M 783	M3-05 DO YOU REMOVE OR REPLACE COMPLETE MOTORS	51	71	46	
M 784	M3-06 DO YOU REMOVE OR REPLACE MOTOR PARTS	26	40	19	
M 785	M3-07 DO YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS OF MOTORS	53	71	54	MOTORS AND GENERATORS
M 786	M3-08 DO YOU TROUBLESHOOT DOWN TO COMPONENT PARTS OF MOTORS	17	29	8	
M 787	M3-09 DO YOU PERFORM ANY TASKS ON FIELD COILS	6	8	8	
M 788	M3-10 DO YOU PERFORM ANY TASKS ON ARMATURES	13	12	15	
M 789	M3-11 DO YOU PERFORM ANY TASKS ON ROTORS	10	13	15	
M 790	M3-12 DO YOU PERFORM ANY TASKS ON BRUSHES	14	23	12	
M 791	M3-13 DO YOU PERFORM ANY TASKS ON SLIP RINGS	13	25	4	
M 792	M3-14 DO YOU PERFORM ANY TASKS ON COMMUTATORS	9	12	12	
M 793	M3-15 DO YOU PERFORM ANY TASKS ON POLE PIECES	9	12	12	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
M 794	M3-16 DO YOU DETERMINE OR MEASURE THE MAGNITUDE OF THE FORCE OR TORQUE CREATED BY A MOTOR	10	15	8	
M 795	M3-17 DO YOU DETERMINE OR MEASURE THE DIRECTION OF THE MECHANICAL FORCE OR TORQUE CREATED BY A MOTOR	20	31	19	
M 796	M3-18 DO YOU DETERMINE OR MEASURE THE MAGNITUDE OR DIRECTION OF THE INDUCED VOLTAGE IN MOTORS	8	10	12	
M 797	M3-19 DO YOU WORK WITH SYNCHRONOUS MOTORS	37	50	42	
M 798	M3-20 DO YOU WORK WITH INDUCTION MOTORS	33	48	31	
M 799	M3-21 DO YOU WORK WITH SPLIT-PHASE MOTORS	18	19	31	
M 800	M3-22 DO YOU WORK WITH SOME COMBINATION OF THE ABOVE MOTORS	32	48	31	
M 801	M3-23 DO YOU INSPECT GENERATORS	31	44	31	
M 802	M3-24 DO YOU CLEAN OR LUBRICATE GENERATORS	22	31	27	
M 803	M3-25 DO YOU OPERATE GENERATORS	30	40	31	
M 804	M3-26 DO YOU REMOVE OR REPLACE COMPLETE GENERATORS	37	52	38	
M 805	M3-27 DO YOU REMOVE OR REPLACE GENERATOR PARTS	10	13	4	
M 806	M3-28 DO YOU TROUBLESHOOT AS FAR AS CHECKING WIRE CONNECTIONS OF GENERATORS	37	48	42	
M 807	M3-29 DO YOU TROUBLESHOOT DOWN TO COMPONENT PARTS OF GENERATORS	5	8	0	
N 808	N1-01 DO YOU WORK WITH METERS IN YOUR PRESENT JOB	77	87	77	
N 809	N1-02 DO YOU CONCEPTUALIZE OR CONSIDER THE FUNCTIONS OF PERMANENT MAGNETS	14	15	15	
N 810	N1-03 DO YOU CONCEPTUALIZE OR CONSIDER THE FUNCTIONS OF MOVING COILS	15	15	15	
N 811	N1-04 DO YOU CONCEPTUALIZE OR CONSIDER THE FUNCTIONS OF SPIRAL SPRINGS	12	10	15	METER MOVEMENTS
N 812	N1-05 DO YOU READ METER SCALES	81	92	81	
N 813	N1-06 DO YOU EXTEND THE RANGE OF AMMETERS	34	40	27	
N 814	N1-07 DO YOU ZERO OHMMETERS	80	90	81	
N 815	N1-08 DO YOU ZERO AMMETERS	32	31	27	
N 816	N1-09 DO YOU EXTEND THE RANGE OF VOLTMETERS	49	67	31	
N 817	N1-10 DO YOU USE OR REFER TO VOLTMETER SENSITIVITY (EXPRESSED IN UNITS OF OHMS PER VOLT)	39	50	27	
N 818	N2-01 DO YOU WORK WITH SATURABLE REACTORS OR MAGNETIC AMPLIFIERS IN YOUR PRESENT JOB	31	38	35	
N 819	N2-02 DO YOU INSPECT MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	28	37	27	
N 820	N2-03 DO YOU CLEAN MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	17	23	15	
N 821	N2-04 DO YOU ADJUST MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	14	13	15	SATURABLE REACTORS AND MAGNETIC AMPLIFIERS
N 822	N2-05 DO YOU TROUBLESHOOT MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	26	33	27	
N 823	N2-06 DO YOU REMOVE OR REPLACE MAGNETIC AMPLIFIERS OR SATURABLE REACTORS	30	40	27	
N 824	N2-07 DO YOU REMOVE OR REPLACE MAGNETIC AMPLIFIER OR SATURABLE REACTOR COMPONENTS	11	15	8	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029	
N 825	N2-08 DO YOU USE OR REFER TO HYSTERESIS CURVES OR LOOPS	6	8	4	
N 826	N2-09 DO YOU INTERPRET SCHEMATIC DRAWINGS TO DEVELOP OUTPUT WAVEFORMS ACROSS REACTOR WINDINGS OR LOAD RESISTORS OF SINGLE WINDING SATURABLE REACTORS	5	4	4	
N 827	N2-10 DO YOU MEASURE OUTPUT WAVEFORMS ACROSS REACTOR WINDINGS OR LOAD RESISTORS OF SINGLE WINDING SATURABLE REACTORS	6	6	4	
N 828	N2-11 DO YOU INTERPRET SCHEMATIC DRAWINGS TO DEVELOP OUTPUT WAVEFORMS FOR MAGNETIC AMPLIFIERS	5	4	8	
N 829	N2-12 DO YOU USE OR REFER TO COERCIVE FORCE IN SATURABLE REACTORS	2	2	4	
N 830	N2-13 DO YOU USE OR REFER TO RESIDUAL MAGNETISM IN SATURABLE REACTORS	3	2	4	
N 831	N2-14 DO YOU USE OR REFER TO FLUX DENSITY IN SATURABLE REACTORS	2	2	4	
N 832	N2-15 DO YOU USE OR REFER TO POINT OF SATURATION IN SATURABLE REACTORS	3	2	4	
N 833	N2-16 DO YOU USE OR REFER TO SATURABLE REACTOR SCHEMATIC SYMBOLS	6	4	19	
N 834	N3-01 DO YOU WORK WITH WAVESHAPING CIRCUITS IN YOUR PRESENT JOB	44	56	38	
N 835	N3-02 DO YOU USE OR REFER TO TRANSIENT INTERVALS	17	17	15	
N 836	N3-03 DO YOU USE OR REFER TO PULSE WIDTH (PW)	42	48	38	
N 837	N3-04 DO YOU USE OR REFER TO PULSE RECURRENCE TIME (PRT)	32	35	27	
N 838	N3-05 DO YOU USE OR REFER TO PULSE RECURRENCE FREQUENCY (PRF)	44	54	38	
N 839	N3-06 DO YOU USE OR REFER TO DIFFERENTIATING CIRCUITS	18	27	4	
N 840	N3-07 DO YOU USE OR REFER TO INTEGRATING CIRCUITS	23	27	12	
N 841	N3-08 DO YOU USE OR REFER TO THE CLASSIFICATION OF TIME CONSTANTS (TC) AS LONG, MEDIUM, OR SHORT	16	21	4	
N 842	N3-09 DO YOU DETERMINE WHETHER AN LR OR RC CIRCUIT IS DIFFERENTIATING OR INTEGRATING BASED ON THE TIME CONSTANT AND OUTPUT CONFIGURATION	4	2	4	
N 843	N3-10 DO YOU WORK WITH SQUARE WAVE GENERATORS	16	8	19	
N 844	N3-11 DO YOU WORK WITH RECTANGULAR WAVE GENERATORS	12	2	15	
O 845	01-01 DO YOU WORK ON SINGLE SIDEBAND SYSTEMS IN YOUR PRESENT JOB	2	4	0	
O 846	01-02 DO YOU INSPECT SSB TRANSMIT OR RECEIVE SYSTEMS	2	4	0	
O 847	01-03 DO YOU CLEAN SSB TRANSMIT OR RECEIVE SYSTEMS	1	2	0	
O 848	01-04 DO YOU ALIGN SSB TRANSMIT OR RECEIVE SYSTEMS	2	4	0	
O 849	01-05 DO YOU TROUBLESHOOT TO SSB TRANSMIT OR RECEIVE SYSTEMS	1	2	0	
O 850	01-06 DO YOU TROUBLESHOOT TO SSB TRANSMIT OR RECEIVE COMPONENTS	2	4	0	
O 851	01-07 DO YOU REMOVE OR REPLACE SSB TRANSMIT OR RECEIVE SYSTEMS	1	2	0	
O 852	01-08 DO YOU REMOVE OR REPLACE SSB TRANSMIT OR RECEIVE COMPONENTS	1	2	0	

WAVESHAPING CIRCUITS

SINGLE SIDEBAND SYSTEMS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029
0 853	01-09 DO YOU PERFORM TASKS ON SSB AUDIO AMPLIFIERS	2	4	0
0 854	01-10 DO YOU PERFORM TASKS ON SSB BALANCED MODULATORS	2	4	0
0 855	01-11 DO YOU PERFORM TASKS ON SSB CARRIER OSCILLATORS	2	4	0
0 856	01-12 DO YOU PERFORM TASKS ON SSB LC FILTERS	2	4	0
0 857	01-13 DO YOU PERFORM TASKS ON SSB CRYSTAL FILTERS	2	4	0
0 858	01-14 DO YOU PERFORM TASKS ON SSB MECHANICAL FILTERS	1	2	0
0 859	01-15 DO YOU PERFORM TASKS ON SSB OSCILLATORS	2	4	0
0 860	01-16 DO YOU PERFORM TASKS ON SSB MIXERS	2	4	0
0 861	01-17 DO YOU PERFORM TASKS ON SSB DRIVERS	1	2	0
0 862	01-18 DO YOU PERFORM TASKS ON SSB POWER AMPLIFIERS	2	4	0
0 863	01-19 DO YOU PERFORM TASKS ON SSB RF AMPLIFIERS	2	4	0
0 864	01-20 DO YOU PERFORM TASKS ON SSB FREQUENCY CONVERTERS	2	4	0
0 865	01-21 DO YOU PERFORM TASKS ON SSB IF AMPLIFIERS	2	4	0
0 866	01-22 DO YOU PERFORM TASKS ON SSB DEMODULATORS	2	4	0
0 867	01-23 DO YOU PERFORM TASKS ON SSB DON'T REMEMBER WHICH SSB SYSTEM STAGES	1	2	0
0 868	01-24 DO YOU USE OR REFER TO SELECTIVE FADING	1	2	0
0 869	01-25 DO YOU USE OR REFER TO PEAK POWER	2	4	0
0 870	01-26 DO YOU USE OR REFER TO FREQUENCY STABILITY	2	4	0
0 871	01-27 DO YOU USE OR REFER TO RESPONSE CURVES FOR BANDWIDTH FILTERS	2	4	0
0 872	01-28 DO YOU CALCULATE PEAK POWER OR EFFECTIVE POWER OF SSB TRANSMITTERS	2	4	0
0 873	01-29 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SSB TRANSMITTER SCHEMATIC DIAGRAMS	2	4	0
0 874	01-30 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH SSB RECEIVER SCHEMATIC DIAGRAMS	2	4	0
0 875	02-01 DO YOU WORK ON PULSE MODULATION SYSTEMS IN YOUR PRESENT JOB	43	63	27
0 876	02-02 DO YOU INSPECT PULSE MODULATION SYSTEMS	37	60	19
0 877	02-03 DO YOU CLEAN PULSE MODULATION SYSTEMS	26	42	15
0 878	02-04 DO YOU ALIGN PULSE MODULATION SYSTEMS	34	52	15
0 879	02-05 DO YOU TROUBLESHOOT TO PULSE MODULATION SYSTEMS	43	63	27
0 880	02-06 DO YOU TROUBLESHOOT TO PULSE MODULATION SYSTEM COMPONENTS	37	58	15
0 881	02-07 DO YOU REMOVE OR REPLACE PULSE MODULATION SYSTEMS	43	63	27
0 882	02-08 DO YOU REMOVE OR REPLACE PULSE MODULATION SYSTEM COMPONENTS	31	50	12
0 883	02-09 DO YOU WORK ON PULSE-AMPLITUDE MODULATION (PAM) SYSTEMS	19	29	8
0 884	02-10 DO YOU WORK ON PULSE-DURATION MODULATION (PDM) SYSTEMS	17	21	12
0 885	02-11 DO YOU WORK ON PULSE-POSITION MODULATION (PPM) SYSTEMS	3	6	0
0 886	02-12 DO YOU WORK ON PULSE-CODE MODULATION (PCM) SYSTEMS	3	4	0
0 887	02-13 DO YOU WORK ON LINE PULSING MODULATION SYSTEMS	4	8	0
0 888	02-14 DO YOU WORK ON DON'T REMEMBER WHICH TYPE OF MODULATION SYSTEM	22	33	12

PULSE MODULATION SYSTEMS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
0 889	02-15 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM POWER SUPPLIES	33	52	15
0 890	02-16 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM CHARGING CHOKES AND CHARGING DIODES	12	19	8
0 891	02-17 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM PULSE FORMING NETWORKS	38	60	27
0 892	02-18 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM TIMERS	24	38	8
0 893	02-19 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM SWITCHES SUCH AS GAS THYRATRONS	34	54	19
0 894	02-20 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM PULSE TRANSFORMERS	35	54	19
0 895	02-21 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM TRANSMITTER TUBES	35	52	19
0 896	02-22 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM RF AMPLIFIERS	35	52	19
0 897	02-23 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM FREQUENCY CONVERTERS	37	58	23
0 898	02-24 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM IF AMPLIFIERS	35	54	19
0 899	02-25 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM DETECTORS	34	54	15
0 900	02-26 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM VIDEO AMPLIFIERS	34	54	12
0 901	02-27 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM POWER VIDEO AMPLIFIERS	21	31	4
0 902	02-28 DO YOU PERFORM TASKS ON PULSE MODULATION SYSTEM DON'T REMEMBER WHICH PULSE MODULATION SYSTEM STAGES	12	15	4
0 903	02-29 DO YOU USE OR REFER TO PULSE RECURRENCE FREQUENCY (PRF)	43	63	23
0 904	02-30 DO YOU USE OR REFER TO PULSE RECURRENCE TIME (PRT)	23	29	15
0 905	02-31 DO YOU USE OR REFER TO PULSE WIDTH (PW)	40	56	27
0 906	02-32 DO YOU USE OR REFER TO PULSE SHAPE	30	44	19
0 907	02-33 DO YOU USE OR REFER TO PEAK POWER	36	50	19
0 908	02-34 DO YOU USE OR REFER TO AVERAGE POWER	33	48	12
0 909	02-35 DO YOU CALCULATE PULSE RECURRENCE TIME (PRT) OR PULSE RECURRENCE FREQUENCY (PRF)	23	33	15
0 910	02-36 DO YOU MEASURE PULSE RECURRENCE TIME (PRT) OR PULSE RECURRENCE FREQUENCY (PRF)	38	58	23
0 911	02-37 DO YOU USE FORMULAS TO CALCULATE AVERAGE POWER OR PEAK POWER OF PULSE MODULATION TRANSMIT SYSTEMS	14	19	12
0 912	02-38 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH PULSE MODULATION TRANSMITTER SCHEMATIC DIAGRAMS	37	52	23
0 913	02-39 DO YOU TRACE SIGNALS OR CURRENT PATHS THROUGH PULSE MODULATION RECEIVER SCHEMATIC DIAGRAMS	37	52	23
0 914	03-01 DO YOU WORK WITH ANTENNAS IN YOUR PRESENT JOB	84	92	88
0 915	03-02 DO YOU INSPECT ANTENNAS	84	92	88

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

BY-TSK	SPC 026	SPC 028	SPC 029
0 916 03-03 DO YOU CLEAN ANTENNAS	66	69	73
0 917 03-04 DO YOU PHYSICALLY ALIGN ANTENNAS	70	77	62
0 918 03-05 DO YOU ELECTRICALLY ALIGN ANTENNAS	71	75	65
0 919 03-06 DO YOU TROUBLESHOOT TO ANTENNAS	84	94	81
0 920 03-07 DO YOU TROUBLESHOOT TO ANTENNA COMPONENTS	70	83	65
0 921 03-08 DO YOU REMOVE OR INSTALL ANTENNAS	84	94	81
0 922 03-09 DO YOU REMOVE OR REPLACE COMPONENTS OF ANTENNAS	69	75	62
0 923 03-10 DO YOU USE OR REFER TO TECHNICAL DATA CONTAINING REPRESENTATIONS OF E OR ELECTRIC FIELD LINES	9	10	4
0 924 03-11 DO YOU USE OR REFER TO TECHNICAL DATA CONTAINING REPRESENTATIONS OF H OR MAGNETIC FIELD LINES	6	6	0
0 925 03-12 DO YOU DETERMINE THE DIRECTION OF THE MAGNETIC LINES IN RELATION TO THE ELECTRIC LINES OF FORCE FOR ANTENNAS	6	6	0
0 926 03-13 DO YOU USE OR REFER TO THE GENERAL RULE THAT ANTENNAS WHICH ARE OF CORRECT LENGTH (HALF-WAVE) ACT AS INDUCTIVE LOADS TO THE GENERATOR	10	8	8
0 927 03-14 DO YOU USE OR REFER TO THE GENERAL RULE THAT ANTENNAS WHICH ARE LONGER THAN A HALF-WAVE ACT AS INDUCTIVE LOADS TO THE GENERATOR	10	8	8
0 928 03-15 DO YOU USE OR REFER TO THE GENERAL RULE THAT ANTENNAS WHICH ARE SHORTER THAN A HALF-WAVE ACT AS CAPACITIVE LOADS TO THE GENERATOR	6	4	4
0 929 03-16 DO YOU WORK WITH HERTZ ANTENNAS	14	15	15
0 930 03-17 DO YOU WORK WITH MARCONI ANTENNAS	1	0	0
0 931 03-18 DO YOU WORK WITH BROADSIDE ARRAYS	3	4	0
0 932 03-19 DO YOU WORK WITH END-FIRE ARRAYS	6	10	4
0 933 03-20 DO YOU WORK WITH CARDIOID ARRAYS	3	6	0
0 934 03-21 DO YOU WORK WITH COLLINEAR ARRAYS	9	10	4
0 935 03-22 DO YOU USE OR REFER TO THE TERM ELECTROMAGNETIC INDUCTION FIELDS WHEN WORKING WITH ANTENNAS	5	2	8
0 936 03-23 DO YOU MEASURE ELECTROMAGNETIC INDUCTION FIELDS OF ANTENNAS	3	2	0
0 937 03-24 DO YOU USE OR REFER TO THE TERM ELECTROMAGNETIC RADIATION FIELDS WHEN WORKING WITH ANTENNAS	15	12	15
0 938 03-25 DO YOU MEASURE ELECTROMAGNETIC RADIATION FIELDS OF ANTENNAS	4	4	0
0 939 03-26 DO YOU USE OR REFER TO THE TIME PHASE OF ELECTRIC (E) AND MAGNETIC (H) COMPONENTS IN ANTENNA RADIATION	3	4	4
0 940 03-27 DO YOU USE OR REFER TO THE TIME PHASE OF ELECTRIC (E) AND MAGNETIC (H) COMPONENTS IN ANTENNA INDUCTION FIELD	3	4	0
0 941 03-28 ARE ANY OF THE ANTENNAS YOU WORK ON LINEARLY POLARIZED	16	6	4
0 942 03-29 ARE ANY OF THE ANTENNAS YOU WORK ON CIRCULARLY POLARIZED	19	8	19
0 943 03-30 DO YOU MEASURE OR DETERMINE THE POLARITY OF ANTENNAS YOU WORK ON	5	0	0
0 944 03-31 DO YOU CONSTRUCT, OR MAKE THE CALCULATIONS NECESSARY TO CONSTRUCT, ANTENNAS OF CORRECT LENGTH FOR SPECIFIC WAVELENGTHS	2	0	4

ANTENNAS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	DY-TSK	SPC 026	SPC 028	SPC 029
O 945	03-32 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN PARASITIC ELEMENTS	10	13	4
O 946	03-33 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN PARASITIC ELEMENTS SERVING AS DIRECTORS	3	4	0
O 947	03-34 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN PARASITIC ELEMENTS SERVING AS REFLECTORS	10	15	4
O 948	03-35 DO THE ANTENNA ARRAYS YOU WORK WITH CONTAIN DON'T REMEMBER WHAT KIND OF ELEMENTS	37	44	46
O 949	03-36 DO YOU WORK ON UNIDIRECTIONAL ANTENNAS	25	23	27
O 850	03-37 DO YOU WORK ON BIDIRECTIONAL ANTENNAS	22	27	19
O 851	03-38 DO YOU WORK ON DON'T REMEMBER THE DIRECTIONALITY	43	58	38
O 852	03-39 DO YOU WORK WITH ROTAR ANTENNA ARRAYS	36	56	23
P 953	P1-01 IN YOUR PRESENT JOB DO YOU WORK WITH TRANSMISSION LINES (TRANSMISSION LINES ARE DEFINED TO INCLUDE LEADS BETWEEN RECEIVERS AND ANTENNAS, TELEPHONE LEADS, AS WELL AS HIGH VOLTAGE POWER LINES, ETC. DO NOT CONSIDER WAVEGUIDES AS TRANSMISSION LINES	21	25	12
P 954	P1-02 DO YOU REFER TO OR USE COPPER LOSS OR I2R LOSS IN TRANSMISSION LINES	1	0	0
P 955	P1-03 DO YOU REFER TO OR USE SKIN EFFECTS OF HIGH FREQUENCY CURRENTS IN TRANSMISSION LINES	1	0	0
P 956	P1-04 DO YOU REFER TO OR USE RADIATION LOSS IN TRANSMISSION LINES	3	2	0
P 957	P1-05 DO YOU USE OR REFER TO DIELECTRIC LOSS IN TRANSMISSION LINES	2	0	0
P 958	P1-06 DO YOU USE OR REFER TO LEAKAGE LOSSES IN TRANSMISSION LINES	5	4	4
P 959	P1-07 DO YOU WORK WITH TWISTED PAIR TRANSMISSION LINES	5	8	8
P 960	P1-08 DO YOU WORK WITH TWIN LEAD TRANSMISSION LINES	3	6	4
P 961	P1-09 DO YOU WORK WITH OPEN TWO-WIRE TRANSMISSION LINES	3	2	4
P 962	P1-10 DO YOU WORK WITH FLEXIBLE COAXIAL CABLE TRANSMISSION LINES	19	25	12
P 963	P1-11 DO YOU WORK WITH RIGID COAXIAL CABLE TRANSMISSION LINES	5	2	8
P 964	P1-12 DO YOU TROUBLESHOOT TRANSMISSION LINES	17	21	8
P 965	P1-13 DO YOU ANALYZE VOLTAGE OR CURRENT WAVEFORMS IN TRANSMISSION LINES TO DETERMINE THE TYPE OF TERMINATION (OPEN, SHORTED, CAPACITIVE, INDUCTIVE)	3	4	0
P 966	P1-14 DO YOU SELECT APPROPRIATE TRANSMISSION LINES TERMINATIONS TO ACHIEVE DESIRED WAVEFORMS	1	2	0
P 967	P1-15 DO YOU USE OR REFER TO SCHEMATIC SYMBOLS FOR LINE TERMINATIONS IN TERMS OF CIRCUIT TERMINATIONS	2	0	0
P 968	P1-16 DO YOU MEASURE STANDING WAVE RATIOS (SR) OF TRANSMISSION LINES	1	0	0
P 969	P1-17 DO YOU CALCULATE STANDING WAVE RATIOS (SWR) OF TRANSMISSION LINES	0	0	0
P 970	P1-18 DO YOU PERFORM THE CALCULATIONS NECESSARY TO DETERMINE THE IMPEDANCE AND LENGTH OF QUARTER - WAVELENGTH MATCHING TRANSFORMERS TO MATCH TRANSMISSION LINES TO LOADS	0	0	0

TRANSMISSION LINES

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TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	QY-TSK	SPC 026	SPC 028	SPC 029
P 971	P1-19 DO YOU WORK WITH TRANSMISSION LINES WHICH ARE MATCHED TO LOADS USING MATCHING TRANSFORMERS	5	8	4
P 972	P1-20 DO YOU WORK WITH TRANSMISSION LINES WHICH ARE MATCHED TO LOADS USING DELTA MATCHING	0	0	0
P 973	P1-21 DO YOU SELECT THE TYPE OF TRANSMISSION LINE NEEDED FOR PARTICULAR JOBS WITHOUT REFERRING TO TECHNICAL DATA	2	0	4
P 974	P1-22 DO YOU USE OR REFER TO THE TERM CHARACTERISTIC IMPEDANCE (Z0) OF TRANSMISSION LINES	1	0	0
P 975	P1-23 DO YOU CALCULATE THE CHARACTERISTIC IMPEDANCE (Z0) OF TRANSMISSION LINES	0	0	0
P 976	P1-24 DO YOU USE OR REFER TO THE TERM CUTOFF FREQUENCY OF TRANSMISSION LINES	0	0	0
P 977	P1-25 DO YOU USE OR REFER TO THE TERM VELOCITY FACTOR (K) OF TRANSMISSION LINES	1	2	0
P 978	P1-26 DO YOU COMPUTE THE ELECTRICAL LENGTH OF TRANSMISSION LINES FOR PARTICULAR FREQUENCIES	2	4	0
P 979	P1-27 DO YOU CONSTRUCT TRANSMISSION LINES OF PARTICULAR ELECTRICAL LENGTH FOR GIVEN FREQUENCIES	0	0	0
P 980	P1-28 DO YOU USE OR REFER TO THE GENERAL RULE THAT AS THE FREQUENCY INCREASES AND THE PHYSICAL LENGTH OF TRANSMISSION LINES REMAIN CONSTANT, THE ELECTRICAL LENGTH INCREASES	3	4	0
P 981	P1-29 DO YOU WORK WITH NONRESONANT (FLAT) TRANSMISSION LINES	1	2	0
P 982	P1-30 DO YOU WORK WITH RESONANT TRANSMISSION LINES	4	6	4
P 983	P1-31 DO YOU WORK WITH TRANSMISSION LINES WHICH ARE MATCHED TO LOADS USING STUB MATCHING	1	2	0
P 984	P2-01 DO YOU WORK WITH WAVEGUIDES OR CAVITY RESONATORS IN YOUR PRESENT JOB	79	87	77
P 985	P2-02 DO YOU INSPECT WAVEGUIDES OR CAVITY RESONATORS	81	92	73
P 986	P2-03 DO YOU CLEAN WAVEGUIDES OR CAVITY RESONATORS	50	60	46
P 987	P2-04 DO YOU BEND WAVEGUIDES OR CAVITY RESONATORS	25	37	27
P 988	P2-05 DO YOU TWIST WAVEGUIDES OR CAVITY RESONATORS	18	25	19
P 989	P2-06 DO YOU PRESSURIZE WAVEGUIDES OR CAVITY RESONATORS	76	90	62
P 990	P2-07 DO YOU PURGE WAVEGUIDES OR CAVITY RESONATORS	20	25	0
P 991	P2-08 DO YOU TROUBLESHOOT WAVEGUIDES OR CAVITY RESONATORS	69	81	62
P 992	P2-09 DO YOU REMOVE OR INSTALL COMPLETE WAVEGUIDES	78	92	62
P 993	P2-10 DO YOU REMOVE OR INSTALL WAVEGUIDE SECTIONS	73	79	73
P 994	P2-11 DO YOU REMOVE OR INSTALL DUMMY LOADS	73	92	58
P 995	P2-12 DO YOU REMOVE OR INSTALL E BENDS	22	33	8
P 996	P2-13 DO YOU REMOVE OR INSTALL H BENDS	21	29	8
P 997	P2-14 DO YOU REMOVE OR INSTALL OTHER BENDS	47	52	38
P 998	P2-15 DO YOU REMOVE OR INSTALL CHOKE JOINTS	23	37	4
P 999	P2-16 DO YOU REMOVE OR INSTALL ROTATING JOINTS	33	37	31
P1000	P2-17 DO YOU REMOVE OR INSTALL DIRECTIONAL COUPLERS	67	88	38
P1001	P2-18 DO YOU REMOVE OR INSTALL BIDIRECTIONAL COUPLERS	28	21	23
P1002	P2-19 DO YOU USE OR REFER TO >A> WALL OF WAVEGUIDES	8	15	4

WAVEGUIDES AND CAVITY RESONATORS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 025	SPC 028	SPC 029
P1003	P2-20 DO YOU USE OR REFER TO >B> WALL OF WAVEGUIDES	8	15	4
P1004	P2-21 DO YOU USE OR REFER TO CUTOFF FREQUENCY OF WAVEGUIDES	10	13	12
P1005	P2-22 DO YOU USE OR REFER TO FREQUENCY-DETERMINING WALL OF WAVEGUIDES	11	15	12
P1006	P2-23 DO YOU USE OR REFER TO POWER-DETERMINING WALL OF WAVEGUIDES	10	12	15
P1007	P2-24 DO YOU USE OR REFER TO ELECTRIC FIELD BOUNDARY CONDITIONS	3	8	0
P1008	P2-25 DO YOU USE OR REFER TO MAGNETIC FIELD BOUNDARY CONDITIONS	5	8	8
P1009	P2-26 DO YOU USE OR REFER TO DUPLEXER FIELD BOUNDARY CONDITIONS	6	12	4
P1010	P2-27 DO YOU USE OR REFER TO THE GENERAL RULE THAT MOST WAVEGUIDES ARE MADE WITH A >B> WALL SIZE OF .7 WAVELENGTHS OF THE OPERATING FREQUENCY	6	13	0
P1011	P2-28 DO YOU USE OR REFER TO THE GENERAL RULE THAT MOST >A> WALLS RANGE FROM .2 TO .5 WAVELENGTHS IN SIZE, WITH .35 USED AS AN AVERAGE	4	10	0
P1012	P2-29 ARE YOU CONCERNED WITH THE MATERIAL (SUCH AS BRASS) WHICH WAVEGUIDES ARE MADE OF	6	4	8
P1013	P2-30 DO YOU COMPUTE THE LENGTH OF A WAVEGUIDE FOR SPECIFIC INSTALLATION	3	4	8
P1014	P2-31 DO YOU USE THE RIGHT HAND RULE TO DETERMINE THE DIRECTION OF PROPAGATION, DIRECTION OF >E> FIELD, OR DIRECTION OF >H> FIELD IN WAVEGUIDES	3	6	0
P1015	P2-32 DO YOU USE OR REFER TO THE TIME PHASE OF PEAK >E> OR >H> LINES IN WAVEGUIDES	1	2	0
P1016	P2-33 DO YOU MEASURE THE TIME PHASE OF >E> OR >H> LINES IN WAVEGUIDES	1	2	0
P1017	P2-34 DO YOU USE OR REFER TO THE SPACE QUADRATURE OF >E> OR >H> LINES IN WAVEGUIDES	1	2	0
P1018	P2-35 ARE HIGH POWER PROBES USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	11	12	4
P1019	P2-36 ARE LOW POWER PROBES USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	5	4	4
P1020	P2-37 ARE LOOPS USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	4	2	4
P1021	P2-38 ARE APERTURES (WINDOWS OR IRISES) USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	19	19	23
P1022	P2-39 ARE DON'T REMEMBER THE KIND OF ENERGY COUPLING USED ON WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	35	35	38
P1023	P2-40 DO YOU DETERMINE WHERE PROBES SHOULD BE MOUNTED IN WAVEGUIDES OR CAVITY RESONATORS WITHOUT REFERRING TO TECHNICAL DATA	1	0	0
P1024	P2-41 DO YOU DETERMINE THE POSITIONING OF LOOPS IN WAVEGUIDES OR CAVITY RESONATORS WITHOUT REFERRING TO TECHNICAL DATA	0	0	0

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
P1025	P2-42 DO YOU DETERMINE THE POSITIONING OR SIZE OF APERTURES IN WAVEGUIDES OR CAVITY RESONATORS WITHOUT REFERRING TO TECHNICAL DATA	1	2	0
P1026	P2-43 ARE CHOKE JOINTS USED IN WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	22	42	0
P1027	P2-44 ARE ROTATING JOINTS USED IN WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	50	69	38
P1028	P2-45 ARE DON'T REMEMBER THE KIND OF JOINTS USED IN WAVEGUIDES OR CAVITY RESONATORS YOU WORK WITH	24	21	31
P1029	P2-46 DO YOU TUNE CAVITY RESONATORS USING CAPACITIVE TUNING	9	12	0
P1030	P2-47 DO YOU TUNE CAVITY RESONATORS USING INDUCTIVE TUNING	5	8	0
P1031	P2-48 DO YOU TUNE CAVITY RESONATORS USING VOLUME TUNING	11	10	12
P1032	P2-49 DO YOU TUNE CAVITY RESONATORS USING DON'T REMEMBER THE METHOD OF TUNING	34	35	38
P1033	P2-50 DO YOU MEASURE THE FREQUENCY OF SIGNALS IN CAVITY RESONATORS	32	40	27
P1034	P3-01 IN YOUR PRESENT JOB DO YOU WORK WITH KLYSTRONS, TRAVELING WAVE TUBES (TWT), PARAMETRIC AMPLIFIERS, OR MAGNETRONS	67	83	54
P1035	P3-02 DO YOU USE OR REFER TO INTERELECTRODE CAPACITANCE	7	8	4
P1036	P3-03 DO YOU USE OR REFER TO ELECTRON TRANSIT TIME	10	12	8
P1037	P3-04 DO YOU USE OR REFER TO LEAD INDUCTANCE	7	4	8
P1038	P3-05 DO YOU USE OR REFER TO RF LOSSES IN EXTERNAL CIRCUITRY	16	13	12
P1039	P3-06 DO YOU USE OR REFER TO PRINCIPLE OF ELECTRON VELOCITY MODULATION	3	4	4
P1040	P3-07 DO YOU USE OR REFER TO ELECTRON BUNCHING	4	6	4
P1041	P3-08 DO YOU WORK WITH TWO-CAVITY KLYSTRONS	15	15	19
P1042	P3-09 DO YOU WORK WITH THREE-CAVITY KLYSTRONS	3	2	4
P1043	P3-10 DO YOU WORK WITH REFLEX KLYSTRONS	35	48	27
P1044	P3-11 DO YOU WORK WITH TRAVELING-WAVE TUBES (TWT)	2	2	0
P1045	P3-12 DO YOU WORK WITH NONDEGENERATIVE PARAMETRIC AMPLIFIERS	4	0	0
P1046	P3-13 DO YOU WORK WITH UP-CONVERTER PARAMETRIC AMPLIFIERS	3	0	0
P1047	P3-14 DO YOU WORK WITH MAGNETRONS	68	85	54
P1048	P3-15 DO YOU INSPECT KLYSTRONS OR TWT	43	56	42
P1049	P3-16 DO YOU CLEAN KLYSTRONS OR TWT	24	38	15
P1050	P3-17 DO YOU TUNE KLYSTRONS OR TWT ELECTRICALLY	31	35	38
P1051	P3-18 DO YOU TUNE KLYSTRONS OR TWT MECHANICALLY	47	60	46
P1052	P3-19 DO YOU PERFORM OPERATIONAL CHECKS OF KLYSTRONS OR TWT	50	63	46
P1053	P3-20 DO YOU TROUBLESHOOT KLYSTRONS OR TWT	43	60	42
P1054	P3-21 DO YOU REMOVE OR REPLACE COMPLETE KLYSTRON OR TWT	52	67	54
P1055	P3-22 DO YOU REMOVE OR REPLACE KLYSTRON OR TWT COMPONENTS	10	21	0
P1056	P3-23 DO YOU INSPECT PARAMETRIC AMPLIFIERS	5	0	0
P1057	P3-24 DO YOU CLEAN PARAMETRIC AMPLIFIERS	1	0	0
P1058	P3-25 DO YOU ADJUST PARAMETRIC AMPLIFIERS	7	0	0

MICROWAVE AMPLIFIERS AND OSCILLATORS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

BY-TSK		SPC 026	SPC 028	SPC 029
P1059	P3-26 DO YOU TUNE PARAMETRIC AMPLIFIERS	4	0	0
P1060	P3-27 DO YOU PERFORM OPERATIONAL CHECKS OF PARAMETRIC AMPLIFIERS	8	0	4
P1061	P3-28 DO YOU TROUBLESHOOT PARAMETRIC AMPLIFIERS	6	4	0
P1062	P3-29 DO YOU REMOVE OR REPLACE COMPLETE PARAMETRIC AMPLIFIER	9	4	4
P1063	P3-30 DO YOU REMOVE OR REPLACE PARAMETRIC AMPLIFIER COMPONENTS	3	0	0
P1064	P3-31 DO YOU INSPECT MAGNETRONS	60	79	46
P1065	P3-32 DO YOU CLEAN MAGNETRONS	34	56	19
P1066	P3-33 DO YOU ADJUST MAGNETRONS	39	35	46
P1067	P3-34 DO YOU TUNE MAGNETRONS	36	29	46
P1068	P3-35 DO YOU PERFORM OPERATIONAL CHECKS OF MAGNETRONS	64	83	50
P1069	P3-36 DO YOU TROUBLESHOOT MAGNETRONS	53	73	35
P1070	P3-37 DO YOU REMOVE OR REPLACE COMPLETE MAGNETRON	65	81	54
P1071	P3-38 DO YOU REMOVE OR REPLACE MAGNETRON COMPONENTS	10	19	0
P1072	P3-39 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS COLLECTOR PLATES	5	6	4
P1073	P3-40 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CATCHER CAVITIES	2	2	4
P1074	P3-41 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CATCHER GRIDS	2	2	4
P1075	P3-42 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS FEEDBACK LOOPS	1	0	4
P1076	P3-43 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS DRIFT SPACES	0	0	0
P1077	P3-44 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS BUNCHER GRIDS	0	0	0
P1078	P3-45 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS BUNCHER CAVITIES	0	0	0
P1079	P3-46 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CONTROL GRIDS	3	2	4
P1080	P3-47 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TWO-CAVITY KLYSTRONS CATHODES	4	2	12
P1081	P3-48 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON REPELLER (REFLECTOR) PLATES	21	33	15
P1082	P3-49 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON GRIDS	10	15	4
P1083	P3-50 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON GRID CAVITY GAPS	7	10	4
P1084	P3-51 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON RESONANT CAVITIES	23	37	15
P1085	P3-52 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON MAGNETIC COUPLING LOOPS	6	10	4
P1086	P3-53 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON FILAMENTS	13	15	12
P1087	P3-54 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON CATHODES	15	19	12

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TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

BY-TSK		SPC 026	SPC 028	SPC 029
P1088	P3-55 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF REFLEX KLYSTRON OUTPUT LEADS	13	19	8
P1089	P3-56 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES FILAMENTS	6	8	8
P1090	P3-57 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES CATHODES	6	8	8
P1091	P3-58 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES MODULATOR GRIDS	3	2	4
P1092	P3-59 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES ANODES	4	4	8
P1093	P3-60 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES HELIXES	2	2	0
P1094	P3-61 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES COLLECTORS	3	6	4
P1095	P3-62 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES MAGNETS	3	6	0
P1096	P3-63 DO YOU USE OR REFER TO THE OPERATING PRINCIPLES OF TRAVELING-WAVE TUBES ATTENUATORS	5	8	4
P1097	P3-64 DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER FERRITE CIRCULATORS	11	21	0
P1098	P3-65 DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER SIGNAL CAVITIES	3	2	4
P1099	P3-66 DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER IDLER CAVITIES	1	0	0
P1100	P3-67 DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER VARACTOR DIODES	3	2	0
P1101	P3-68 DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER FERRITE ISOLATORS	12	4	31
P1102	P3-69 DO YOU PERFORM TASKS ON PARAMETRIC AMPLIFIER REVERSE-BIAS BATTERIES	2	2	0
P1103	P3-70 DO YOU PERFORM TASKS ON ANODES	9	8	8
P1104	P3-71 DO YOU PERFORM TASKS ON ANODE COOLING PINS	5	4	4
P1105	P3-72 DO YOU PERFORM TASKS ON COUPLING LOOPS	6	4	4
P1106	P3-73 DO YOU PERFORM TASKS ON HEATER LEADS	10	6	23
P1107	P3-74 DO YOU PERFORM TASKS ON RESONANT CAVITIES	17	21	8
P1108	P3-75 DO YOU PERFORM TASKS ON CATHODES	11	10	15
P1109	P3-76 DO YOU PERFORM TASKS ON MAGNETS	14	21	4
Q1110	Q1-01 DO YOU USE OR REFER TO STORAGE REGISTERS	8	2	0
Q1111	Q1-02 DO YOU USE OR REFER TO SHIFT REGISTERS	8	2	0
Q1112	Q1-03 DO YOU USE OR REFER TO LOGIC SYMBOLS OF SHIFT REGISTERS	7	0	4
Q1113	Q1-04 DO YOU USE OR REFER TO LOGIC SYMBOLS OF STORAGE REGISTERS	7	0	4
Q1114	Q1-05 DO YOU TRACE THE DATA FLOW THROUGH LOGIC DIAGRAMS OF SHIFT REGISTERS	7	0	4
Q1115	Q1-06 DO YOU TRACE THE DATA FLOW THROUGH LOGIC DIAGRAMS OF OTHER TYPE OF REGISTERS	9	2	4

REGISTERS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029	
Q1116	G1-07 DO YOU DETERMINE THE STATE OF EACH FLIP-FLOP OF A SHIFT REGISTER AFTER A SPECIFIED NUMBER OF SHIFT PULSES HAVE PASSED	3	2	0	
Q1117	G2-01 DO YOU WORK WITH DIGITAL COUNTERS, REGISTERS, OR STORAGE DEVICES IN YOUR PRESENT JOB	17	8	19	
Q1118	G2-02 DO YOU USE OR REFER TO DELAY LINES	12	10	8	
Q1119	G2-03 DO YOU USE OR REFER TO MAGNETIC CORES	7	2	4	
Q1120	G2-04 DO YOU USE OR REFER TO MAGNETIC DRUMS	6	2	0	
Q1121	G2-05 DO YOU USE OR REFER TO MAGNETIC TAPES	5	2	4	STORAGE DEVICES
Q1122	G2-06 DO YOU USE OR REFER TO ACCESS TIME OR SPEED OF MEMORY SYSTEMS	5	4	0	
Q1123	G2-07 DO YOU USE OR REFER TO WORD CAPACITY OF MEMORY SYSTEMS	4	2	0	
Q1124	G2-08 DO YOU USE OR REFER TO VOLATILITY OF MEMORY SYSTEMS	2	2	0	
Q1125	G2-09 DO YOU USE OR REFER TO LOGIC SYMBOL OF DELAY LINES	4	2	4	
Q1126	G3-01 IN YOUR PRESENT JOB, DO YOU WORK WITH DIGITAL-TO-ANALOG (D/A) CONVERTERS, ANALOG-TO-DIGITAL (A/D) CONVERTERS, OR BINARY-TO-DECIMAL READOUT CONVERTERS	11	2	0	
Q1127	G3-02 DO YOU COMPUTE OUTPUT VOLTAGES FOR ELECTROMECHANICAL DIGITAL-TO-ANALOG (D/A) CONVERTERS FOR GIVEN INPUT VOLTAGES	3	2	0	
Q1128	G3-03 DO YOU USE OR REFER TO THE GENERAL RULE THAT THE COUNT IN ELECTROMECHANICAL DIGITAL-TO-ANALOG (D/A) CONVERTERS IS DETERMINED BY ADDING THE DENOMINATORS OF THE RESISTORS	3	2	0	
Q1129	G3-04 DO YOU COMPUTE ANALOG VOLTAGES FOR GIVEN BINARY COUNTS IN ELECTRONIC DIGITAL-TO-ANALOG (D/A) CONVERTERS	3	2	0	
Q1130	G3-05 DO YOU PERFORM SAMPLE FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	3	0	0	
Q1131	G3-06 DO YOU PERFORM HOLD FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	3	0	0	
Q1132	G3-07 DO YOU PERFORM COMPARE FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	3	0	0	DIGITAL TO ANALOG CONVERTERS
Q1133	G3-08 DO YOU PERFORM DIGITIZE FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	3	0	0	
Q1134	G3-09 DO YOU PERFORM DON'T REMEMBER WHICH FUNCTION TASKS ON VARIABLE TIME ANALOG-TO-DIGITAL (A/D) CONVERTER CIRCUITS	5	2	0	
Q1135	G3-10 DO YOU USE OR REFER TO SAMPLE FUNCTION OF A/D CONVERTERS	2	0	0	
Q1136	G3-11 DO YOU USE OR REFER TO HOLD FUNCTION OF A/D CONVERTERS	3	0	0	
Q1137	G3-12 DO YOU USE OR REFER TO COMPARE FUNCTION OF A/D CONVERTERS	3	0	0	
Q1138	G3-13 DO YOU USE OR REFER TO DIGITAL FUNCTION OF A/D CONVERTERS	3	0	0	
Q1139	G3-14 DO YOU PERFORM ANY TASKS ON MECHANICAL ANALOG-TO-DIGITAL (A/D) CONVERTERS	1	0	0	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

BY-TSK		SPC 024	SPC 028	SPC 029	
R1140	R1-01 DO YOU WORK WITH PHANTASTRON CIRCUITRY IN YOUR PRESENT JOB	17	12	15	PHANTASTRONS
R1141	R2-01 IN YOUR PRESENT JOB DO YOU WORK WITH SCHMITT TRIGGER CIRCUITS	17	12	8	SCHMITT TRIGGERS
R1142	R2-02 DO YOU TRACE DATA FLOW THROUGH SCHMITT TRIGGER SCHEMATIC DIAGRAMS	10	10	8	
R1143	R2-03 DO YOU USE OR REFER TO SCHMITT TRIGGER LOGIC SYMBOLS	3	0	0	
R1144	R3-01 IN YOUR PRESENT JOB DO YOU FABRICATE MULTICONDUCTOR CABLES	30	33	42	CABLE FABRICATION
R1145	R3-02 DO YOU FABRICATE COAXIAL CABLES	53	50	77	
S1146	S1-01 IN YOUR PRESENT JOB DO YOU PERFORM ANY TASKS ON VISUAL READOUT SYSTEMS	23	8	27	
S1147	S1-02 DO YOU PERFORM ANY TASKS ON NIXIE LIGHTS OR NIXIE LIGHT DECODER SYSTEMS	9	2	31	INPUT/OUTPUT DEVICES
S1148	S1-03 DO YOU ANALYZE NIXIE LIGHT DECODER SYSTEMS USING BOOLEAN ALGEBRA	1	2	0	
S1149	S2-01 DO YOU WORK WITH PHOTO TUBES IN YOUR PRESENT JOB	4	6	0	PHOTO SENSITIVE DEVICES
S1150	S3-01 IN YOUR PRESENT JOB DO YOU WORK WITH CHOPPER CIRCUITS	21	12	31	
S1151	S3-02 DO YOU MEASURE EXCITATION FREQUENCIES	9	4	19	
S1152	S3-03 DO YOU MEASURE VOLTAGE-CURRENT PHASE RELATIONSHIPS	8	6	8	
S1153	S3-04 DO YOU USE OR REFER TO EXCITATION FREQUENCIES	10	6	27	
S1154	S3-05 DO YOU USE OR REFER TO VOLTAGE-CURRENT PHASE RELATIONSHIPS	7	8	12	
S1155	S3-06 DO YOU USE SERVOS IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	19	15	27	SYNCHRONOUS VIBRATIONS (CHOPPER CIRCUITS)
S1156	S3-07 DO YOU USE DETECTORS IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	20	15	27	
S1157	S3-08 DO YOU USE ERROR SIGNAL DEVICES IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	20	15	27	
S1158	S3-09 DO YOU USE COMPARISON CIRCUITS IN CONJUNCTION WITH CHOPPER CIRCUIT OPERATION	20	13	31	
T1159	T1-01 DOES YOUR PRESENT JOB INVOLVE ANY TASKS DEALING WITH INFRARED SYSTEMS	10	0	0	
T1160	T1-02 DO YOU INSPECT INFRARED SYSTEMS	10	0	0	
T1161	T1-03 DO YOU CLEAN INFRARED SYSTEMS	9	2	0	
T1162	T1-04 DO YOU ADJUST OR CALIBRATE INFRARED SYSTEMS	10	2	0	
T1163	T1-05 DO YOU OPERATE INFRARED SYSTEMS	10	2	0	
T1164	T1-06 DO YOU TROUBLESHOOT WIRE CONNECTIONS OF INFRARED SYSTEMS	10	2	0	INFRARED
T1165	T1-07 DO YOU TROUBLESHOOT MAJOR ASSEMBLIES OF INFRARED SYSTEMS	10	2	0	
T1166	T1-08 DO YOU TROUBLESHOOT DOWN TO INFRARED SYSTEM COMPONENT PARTS	8	2	0	
T1167	T1-09 DO YOU REMOVE OR REPLACE MAJOR ASSEMBLIES OF INFRARED SYSTEMS	10	2	0	
T1168	T1-10 DO YOU REMOVE OR REPLACE INFRARED SYSTEM COMPONENT PARTS	8	0	0	

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
T1169	T1-11 DO YOU USE OR REFER TO FAR REGION	2	2	0
T1170	T1-12 DO YOU USE OR REFER TO INTERMEDIATE REGION	2	0	0
T1171	T1-13 DO YOU USE OR REFER TO NEAR REGION	3	4	0
T1172	T1-14 DO YOU USE OR REFER TO MICRON	2	0	0
T1173	T1-15 DO YOU USE OR REFER TO GRAY BODIES	1	0	0
T1174	T1-16 DO YOU USE OR REFER TO BLACK BODIES	2	0	0
T1175	T1-17 DO YOU USE OR REFER TO ABSORPTION	2	0	0
T1176	T1-18 DO YOU USE OR REFER TO SCATTERING	2	0	0
T1177	T1-19 DO YOU USE OR REFER TO ABSOLUTE ZERO	1	0	0
T1178	T1-20 DO YOU PERFORM TASKS ON BLITZ	0	0	0
T1179	T1-21 DO YOU PERFORM TASKS ON TARGET BUTTONS	0	0	0
T1180	T1-22 DO YOU PERFORM TASKS ON ERECTOR LENSES	0	0	0
T1181	T1-23 DO YOU PERFORM TASKS ON OCULAR LENSES	1	0	0
T1182	T1-24 DO YOU PERFORM TASKS ON CORRECTION LENSES	1	0	0
T1183	T1-25 DO YOU PERFORM TASKS ON FILTERS	0	0	0
T1184	T1-26 DO YOU PERFORM TASKS ON SPHERICAL MIRRORS	0	0	0
T1185	T1-27 DO YOU PERFORM TASKS ON PLANE MIRRORS	1	0	0
T1186	T2-01 DOES YOUR PRESENT JOB INVOLVE ANY TASKS DEALING WITH LASERS	0	0	0
T1187	T2-02 DO YOU INSPECT LASER SYSTEMS	1	2	0
T1188	T2-03 DO YOU CLEAN LASER SYSTEMS	1	2	0
T1189	T2-04 DO YOU OPERATE LASER SYSTEMS	1	2	0
T1190	T2-05 DO YOU OPERATE LASER SYSTEMS	1	2	0
T1191	T2-06 DO YOU TROUBLESHOOT WIRE CONNECTIONS OF LASER SYSTEMS	1	2	0
T1192	T2-07 DO YOU TROUBLESHOOT MAJOR ASSEMBLIES OF LASER SYSTEMS	1	2	0
T1193	T2-08 DO YOU TROUBLESHOOT TO COMPONENT PARTS OF LASER SYSTEMS	1	2	0
T1194	T2-09 DO YOU REMOVE OR REPLACE MAJOR ASSEMBLIES OF LASER SYSTEMS	1	2	0
T1195	T2-10 DO YOU REMOVE OR REPLACE COMPONENT PARTS OF LASER SYSTEMS	1	2	0
T1196	T2-11 DO YOU USE OR REFER TO ANGSTROMS (A)	1	2	0
T1197	T2-12 DO YOU USE OR REFER TO ELECTRON ENERGY LEVELS	1	2	0
T1198	T2-13 DO YOU USE OR REFER TO GROUND STATE	1	2	0
T1199	T2-14 DO YOU USE OR REFER TO EXCITED STATE	1	2	0
T1200	T2-15 DO YOU USE OR REFER TO PACKET OF RADIATION	1	2	0
T1201	T2-16 DO YOU USE OR REFER TO PHOTONS	1	2	0
T1202	T2-17 DO YOU USE OR REFER TO SPONTANEOUS EMISSION	1	2	0
T1203	T2-18 DO YOU USE OR REFER TO STIMULATED EMISSION	1	2	0
T1204	T2-19 DO YOU USE OR REFER TO COHERENCE OR INCOHERENCE	1	2	0
T1205	T2-20 DO YOU USE OR REFER TO INVERSION LEVEL	1	2	0
T1206	T2-21 DO YOU USE OR REFER TO MONOCHROMATIC	1	2	0
T1207	T2-22 DO YOU WORK WITH ACTIVE MATERIALS	1	2	0
T1208	T2-23 DO YOU WORK WITH PUMPING SOURCES	1	2	0
T1209	T2-24 DO YOU WORK WITH FULL SILVERED (100% REFLECTIVE) MIRRORS	1	2	0

LASERS

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

	BY-TSK	SPC 026	SPC 028	SPC 029
T1210	T2-25 DO YOU WORK WITH HALF SILVERED (92% REFLECTIVE) MIRRORS	1	2	0
T1211	T2-26 DO YOU WORK WITH HELICAL FLASHTUBES	0	0	0
T1212	T2-27 DO YOU WORK WITH RUBY	0	0	0
T1213	T2-28 DO YOU WORK WITH HELIUM-NEON	0	0	0
T1214	T2-29 DO YOU WORK WITH HELIUM-XENON	1	2	0
T1215	T2-30 DO YOU WORK WITH XENON	1	2	0
T1216	T2-31 DO YOU WORK WITH CESIUM-HELIUM	1	2	0
T1217	T2-32 DO YOU WORK WITH ARGON	1	2	0
T1218	T2-33 DO YOU WORK WITH NEODYMIUM IN GLASS	1	2	0
T1219	T2-34 DO YOU WORK WITH GALLIUM ARSENIDE	1	2	0
T1220	T3-01 IN YOUR PRESENT JOB DO YOU WORK WITH DISPLAY TUBES, SUCH AS DIRECT VIEW STORAGE (DVST) OR MULTIPLE MODE STORAGE TUBES (MMST)	23	0	0
T1221	T3-02 DO YOU INSPECT DVST OR MMST	18	2	0
T1222	T3-03 DO YOU CLEAN DVST OR MMST	13	2	0
T1223	T3-04 DO YOU ADJUST OR CALIBRATE DVST OR MMST	18	2	0
T1224	T3-05 DO YOU OPERATE SYSTEMS THAT CONTAIN DVST OR MMST	24	2	0
T1225	T3-06 DO YOU TROUBLESHOOT DVST OR MMST CIRCUITS	18	2	0
T1226	T3-07 DO YOU REMOVE OR REPLACE DVST OR MMST TUBES FROM MAJOR ASSEMBLIES OR UNITS	18	2	0
T1227	T3-08 DO YOU PERFORM TASKS THAT MAKE IT NECESSARY TO NAME THE VARIOUS ELEMENTS OF DVST	10	2	0
T1228	T3-09 DO YOU PERFORM TASKS THAT MAKE IT NECESSARY TO NAME THE VARIOUS ELEMENTS OF MMST	7	2	0
T1229	T3-10 DO YOU PERFORM TASKS ON FLOOD GUNS	10	2	0
T1230	T3-11 DO YOU PERFORM TASKS ON WRITE GUNS	11	2	0
T1231	T3-12 DO YOU PERFORM TASKS ON ATTACK GUNS	10	2	0
T1232	T3-13 DO YOU PERFORM TASKS ON ERASE GUNS	11	2	0
T1233	T3-14 DO YOU PERFORM TASKS ON STORAGE GRIDS	10	2	0
U1234	U1-01 IN YOUR PRESENT JOB, DO YOU PERFORM ANY PROGRAMMING TASKS	8	0	8
U1235	U1-02 DO YOU USE OR REFER TO DECIMAL SYSTEMS	4	0	0
U1236	U1-03 DO YOU USE OR REFER TO PROGRAMS	4	0	4
U1237	U1-04 DO YOU USE OR REFER TO HEXIDECIMAL SYSTEMS	0	0	0
U1238	U1-05 DO YOU USE OR REFER TO 8-4-2-1 SYSTEMS	7	0	4
U1239	U1-06 DO YOU USE OR REFER TO FOUR SYSTEMS	0	0	0
U1240	U1-07 DO YOU USE OR REFER TO BINARY SYSTEMS	6	0	4
U1241	U1-08 DO YOU USE OR REFER TO TIME-SHARING	4	0	0
U1242	U1-09 DO YOU USE OR REFER TO DATA WORDS	6	0	0
U1243	U1-10 DO YOU USE OR REFER TO ADDRESS WORDS	5	0	0
U1244	U1-11 DO YOU USE OR REFER TO ADDRESS/SUBADDRESS	6	0	4
U1245	U1-12 DO YOU USE OR REFER TO STEERING/INFORMATION	4	0	0
U1246	U1-13 DO YOU USE OR REFER TO INFORMATION WORDS	5	0	0
U1247	U1-14 DO YOU PERFORM TASKS ON SINGLE LEVEL PROGRAMMING	2	0	0
U1248	U1-15 DO YOU PERFORM TASKS ON MULTI-LEVEL PROGRAMMING	1	0	0

DISPLAY TUBES

PROGRAMMING

TASK GROUP SUMMARY
PERCENT MEMBERS PERFORMING

BY-TSK		SPC 026	SPC 028	SPC 029	
U1249	01-16 DO YOU PERFORM TASKS ON INPUT DEVICES	4	0	0	
U1250	01-17 DO YOU PERFORM TASKS ON STORAGE DEVICES	4	0	0	
U1251	01-18 DO YOU PERFORM TASKS ON ARITHMETIC SECTIONS	3	0	0	
U1252	01-19 DO YOU PERFORM TASKS ON CONTROL SECTIONS	4	0	0	
U1253	01-20 DO YOU PERFORM TASKS ON OUTPUT DEVICES	4	0	0	
U1254	01-21 DO YOU PERFORM TASKS ON POWER SUPPLIES	4	0	0	
U1255	02-01 DO YOU USE DECIBELS TO EXPRESS AMPLIFICATION AND ATTENUATION	43	62	27	DB AND POWER RATIOS
U1256	02-02 DO YOU USE LOGARITHMS TO COMPUTE OUTPUT POWER IN DECIBELS	4	2	15	
U1257	02-03 DO YOU USE LOGARITHMS TO COMPUTE ATTENUATION IN DECIBELS	4	2	15	
U1258	02-04 DUMMY TASK TO IDENTIFY INCUMBENTS WHO PERFORMED NO TASKS	0	0	0	

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DEFENSIVE FIRE CONTROL SYSTEMS CAREER LADDER AFSC 321X1.(U)
SEP 77 T J O'CONNOR, R D BALLENTINE

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report summarizes the results of the administration of the Electronic Principles Inventory to airmen assigned to Defensive Fire Control Systems Specialty (AFSC 321X1). The report gives a detailed listing of the technical tasks and knowledge needed to perform the jobs within the specialty or career ladder.

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This specialty has the following functions:

Inspects, operates, troubleshoots, repairs, overhauls, and modifies aircraft defensive fire control systems components and test equipment. Inspects, analyzes, and isolates defensive fire control systems malfunctions. Maintains defensive fire control systems. Repairs defensive fire control system and related components. Readies defensive fire control systems for operational missions.